AMERICAN PRINTING HOUSE
FOR THE BLIND, INC.

Department of Educational and Technical Research

REPORT OF RESEARCH AND DEVELOPMENT ACTIVITIES

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Mission

To promote the independence of blind and visually impaired persons by providing specialized materials, products, and services needed for education and life.

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FY 2001 was a year of positive changes for the Educational Research Department. Several programs were developed and implemented within the last six months - new initiatives that will enhance operational performance. Staffing continues to be expanded to meet the needs of product development and research. We have recruited excellent candidates both inside and outside the vision-impairment community.

In the area of product development, a system has been initiated to streamline and coordinate the efforts of those involved.

- Product ideas, originating from within APH or through advisors and inventors, are categorized and entered into the APH submission database.

- A cross-discipline meeting is then held to evaluate each submission and provide basic information as to estimated costs, intensity, priority, and relevance to the vision field in a format which provides continuity and information necessary to make a sound judgement regarding its relevance to our vision-impairment community.

This procedure provides consistent background information on product ideas when presented to the Product Advisory Review Committee. An objective analysis can be made of any and all product ideas. If an item is approved for development, it is moved into the holding area and kept under the appropriate category until released by the Director of Research and assigned to a Project Leader. The "holding" file is reviewed periodically to evaluate each product category for relevance, priority, and the vision-impairment needs. In this manner, no item becomes "lost" in an ever-expanding list. This procedure also allows APH to substitute projects that may not be as relevant as they once were and move items up to immediate priority status if the need arises. As time allows Project Leaders to assume new projects, these product ideas are released. The criteria for removal from the holding file are priority, relevance to the community, and Project Leader availability.

The departments of Educational and Technical Research have been combined under one administrator to allow for closer project planning and implementation. For example, Technical Research will be brought into a project planning stage from the onset to ensure that all appropriate parties are kept informed of issues that will affect the ultimate success of that project.

Funds have been budgeted to add staff to Technical Research in the areas of manufacturing specialists and quality control personnel. A quality control program will be initiated to assure that all applicable standards are met and to establish procedures for receiving incoming raw materials.

Intellectual guidelines have been established to provide APH with the proper and appropriate protection under U.S. patent law. Benefits will be seen in our work with outside vendors and competitive manufacturers, giving APH the recognition it seeks in the areas of trademarks, copyrights, and patents.

To further our goals in product development and provide the proper equipment to our employees, the programmers in Educational Research will be moving to a new workplace within the APH facility. This move will provide a more efficient working environment and allow for growth of this group.

With our focus on continually improving all areas of operation, the Educational and Technical Research Department will be ready to tackle the challenges of 2001 and 2002 and continue to provide excellent educational materials for blind and visually impaired students in our country.

Robert D. Wise
Director of Research

Adult Life

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http://archive.org/details/reportofresearch2001depa

Adult Life Needs (continuing)

Purpose: To develop adult life products and services that are affordable, user-friendly and consumer driven and that address the diverse needs of the blind and visually impaired population

Project staff: Mary T. (Terrie) Terlau, Project Leader

Background. The Adult Life Program began in the summer of 1998. The first Adult Life products as a result of this effort were made available in fiscal year 1999.

Work during FY 2001. A new Adult Life Project Leader was found. Through the Adult Life program, new products needed by blind and visually impaired adults continued to be investigated and developed.

Work planned for FY 2002. The adult Life project will continue to investigate and develop new products for adults. The project will continue to seek input from the field through consumers and consumer groups, focus groups held at APH, and consultants and field reviewers.

Braille Date Book (new)

Purpose: To provide a Braille monthly calendar and appointment-keeping system that is small, durable, and easy to use with a slate and stylus or a Braille writer

Project staff: Mary T. (Terrie) Terlau, Project Leader
Fred Gissoni, Project Advisor

Background. Currently blind persons maintain calendar and appointment records in digital voice recorders, electronic notetakers, cassette recorders, and self-made Braille appointment books. Although electronic notetakers and digital recorders allow easy, fast access to data, they are costly and can not be afforded by a substantial proportion of blind persons. These methods are less reliable than hard copy because appointment and scheduling information is not accessible when internal power is not available. Such information also can be permanently lost in a system malfunction. Although cassette recorders are more affordable, they also require a power source. Additionally, information is difficult to locate because appointments can not be kept easily in order by date. Self-made Braille date books are affordable, portable, and not dependent on a power source. However, Braille date book construction requires more time, effort, and creativity than many people are willing to expend. Most retail construction materials lack durability and specific design features needed to store and preserve Braille.

Numerous professionals and consumers in a variety of settings have identified the need for a ready-made Braille calendar/planner book with a set of features that are incorporated into the Braille Date Book. Such Braille Date Book features include: pre-brailed calendar information; appointment, address, and memo pages; durable binding that accommodates easy brailing of pages with slate and stylus or Braille writer; and methods and instructions for customization .

Work during FY 2001. Concept development and background research on the Braille Date Book were completed. Approval to develop the Braille Date Book was obtained from the Product Review Committee. Prototype design for The Braille Date Book has been undertaken.

Work planned for FY 2002. Prototype construction, field testing, product revision based on field testing responses, initial pilot run, and initial production run are anticipated. Quota approval will be sought. The Braille Date Book is expected to be available in the first quarter of FY 2003.

Label Kit (continuing)

Purpose: To provide adults who are blind and visually impaired information about how to manage identification of objects and materials in their environment, particularly household items, and a tool kit to assist in labeling

Project staff: Mary T. (Terrie) Terlau, Project Leader
Lisa-Anne Mowerson, Project Consultant

Background. This product originally came to APH from an Independent Living Specialist in Kentucky. Her suggestion was to create a set of large print labels that could be used by people with low vision to mark and identify canned goods and pantry items. The Project Leader decided to seek the advice of a group of Rehabilitation Teachers before proceeding with this product. As a result of consultation with members of a focus group brought together to look at needs in the area of activities of daily living, plans for this project were changed. Revised plans are to develop a consumer oriented book that will provide guidance in organizational techniques as well as labeling. A labeling tool kit will also be developed to accompany the book. These materials will help visually impaired adults who are unable to access rehabilitation teacher services to understand and apply organizational and labeling principles. These materials can also be used by teachers with clients whom they see infrequently or who have families that need to understand organizational and labeling principles.

Work during FY 2001. Formalization of consulting agreement arrangements was begun by the new project leader. Investigation of a wide variety of currently available labeling materials and strategies was completed.

Work planned for FY 2002. Formalization of an agreement with a consultant, preparation of the organizational booklet, selection of labeling materials for inclusion in the kit, and preparation of prototypes for field testing will be completed. Field testing, product revisions, and initial pilot and production runs are expected to be completed in FY 2003. The product is expected to be available during the spring of FY 2003.

MasterPlan Financial Record Keeper (ongoing)

Purpose: To develop an organizational tool for adults who have low vision that will provide a system for storing and easy access to personal financial information

Project staff: Mary T. (Terrie) Terlau, Project Leader
Bernie Mudd, Artist

Background. This product is a new addition to the MasterPlan series of low vision organizational tools. Consumers and professionals have responded very favorably to the MasterPlan series and have requested that a tool for organizing and accessing financial information be included in the series.

Work during FY 2001. Financial information categories to be included in the Financial Record Keeper were reviewed and revised by the new project leader. Page lay-out and a product mock-up was completed. A Product Development Committee Meeting was scheduled to review significant design and materials changes and to establish a new project time line.

Work planned for FY 2002. The prototype for the MasterPlan Financial Record Keeper will be completed. The product will be field tested by consumers and professionals and revised as appropriate. Quota approval for this product will be sought. The pilot run will be completed. The product is expected to be available by the first quarter of 2003.

Money Talks (new)

Purpose: To provide a Windows-based bank account management program that is easily accessible to blind and visually impaired persons.

Project staff: Mary T. (Terrie) Terlau, Project Leader
Larry Skutchan, Project Advisor
John Hedges, Programmer

Background. Keeping bank account records on computer provides a reliable method of maintaining check registers and account balances. However, the use of currently available Windows-based bank account management software presents several obstacles to blind and visually impaired persons. Such software typically: does not perform the full range of functions needed by blind and visually impaired persons; requires the use of costly screen reading or magnification software; and presents access problems to persons who have not had extensive training in the use of such software. Money Talks will be designed to: perform the full range of functions needed by blind and visually impaired persons; to be fully accessible with speech and large print output independent of screen reading and magnification software packages; and to be used by persons who have little or no formal training in the use of computers.

Work during FY 2001. Concept development and background research were completed and feasible program features were selected. Approval to begin development of this product was obtained from the Product Review Committee.

Work planned for FY 2002. Software development, programming, writing of documentation, field testing and appropriate revisions to the program prototype will be completed. Quota approval will be sought. Money Talks is expected to be available by the first quarter of FY 2003.

Nonverbal Communication Curriculum (ongoing)

Purpose: To develop an instructional curriculum that will help adults who are blind or visually impaired understand and integrate nonverbal communication skills into their daily lives. Integration of these techniques will improve performance in interpersonal situations including job interviews and work settings

Project staff: Mary T. (Terrie) Terlau, Project Leader
Karen McCulloh, Author

Background. Nonverbal communication, often called body language, refers to the sending and receiving of nonverbal messages. These messages are communicated by body movement (e.g., gesture, posture, facial expression) and by the nonverbal component of speech (e.g., voice intonation, pitch, and volume. As Much as 65% of the meaning derived from verbal interactions comes from their nonverbal elements.

There are two important components of nonverbal communication for people who can not see: the ability to accurately interpret or receive nonverbal messages; and the ability to send appropriate nonverbal messages. People who are blind or visually impaired have difficulty accessing and producing nonverbal cues. They may need specific educational experiences to help them understand what is going on around them and to develop positive methods of nonverbal communication.

This project will result in a curriculum that will help people who are visually impaired learn how to integrate nonverbal communication skills into their daily interactions. Topics such as gestures, posture, social distance, appearance, voice intonations, and facial expressions will be covered. This curriculum will help blind or visually impaired individuals be more successful within interpersonal communication situations like job interviews, professional meetings, advocacy situations, and everyday social interactions.

Work during FY 2001. Work on this project was put on hold until the Adult Life project leader position was filled. Available curriculum materials were reviewed and contact with Ms. McCulloh was re-established.

Work planned for FY 2002. Work on the Nonverbal Behavioral Curriculum will be undertaken in accord with ongoing dialogue with Ms. McCulloh.

Transition Tote System, Revised (new)

Purpose: To update materials and resource lists in a curriculum that teaches skills necessary for successful entry into the world of work and to improve durability, versatility, and appearance of the Transition Tote carrying case

Project staff: Mary T. (Terrie) Terlau, Project Leader

Background. In light of the high unemployment rates for people who are blind or visually impaired, the development of career preparation materials was given high priority by the 1993 APH Educational Research and Development Committee. Extensive investigation of effective transition materials and programs resulted in the choice of a consultant and in the development of the current Transition Tote System.

The Transition Tote System included a Student Manual and carrying case, with an Information Supplement for teachers sold separately. The Student Manual (available in Braille, in Large Print, and on tape) taught organizational skills, self-awareness and self-advocacy, work exploration, job-seeking skills and job-keeping skills. It also contained an extensive list of important Educational, Assistive Technology, and Vocational resources. The Carrying Case was intended to provide a container for Transition study materials and to subsequently serve as a high-quality, professional-looking case that could be used on-the-job to transport large Braille books and folders, cassette recorders, electronic note takers, and laptop computers.

Revision of the Transition Tote system is needed because its written materials have become outdated and because its carrying case has not functioned as originally intended. Student lessons need to be examined to determine if they reflect the most current and promising practices in the transition field. Resource lists in the Student Manual, compiled during 1996 and 1997, contain information on organizations & services, periodicals, books, videotapes, sources for aids & appliances, publishers, transcription services, and toll-free phone numbers. This information is inaccurate because it does not reflect major changes of the past five years in technology, assistive technology, vendors, service delivery systems, and contact information. The Transition carrying case or Tote lacks durability and design features needed to safely transport sensitive electronic equipment such as tape recorders, note takers, and lap top computers. The Tote's appearance is also not consistent with its proposed use to carry large print, Braille, and other differently-sized materials on the job.

Work during FY 2001. Review of the Transition Tote System relative to revision needs was completed and Product Review Committee approval for undertaking revisions was obtained. Acquisition of a consultant/coauthor for the revisions was undertaken.

Work planned for FY 2002. Formalization of arrangements with a project consultant will be completed and research on revisions to student lessons and resource lists shall be undertaken by the consultant and APH staff. A committee consisting of the Adult Life project leader, the Project Consultant, and appropriate APH staff shall be formed to investigate ways to make the transition Tote more attractive and suitable for transporting sensitive electronic devices.

Art

Art History Through Touch and Sound (continuing)

Purpose: To make art history materials available and accessible to legally blind students and adults

Project staff: Frank Hayden, Project Leader
Fred Otto, Project Assistant

Background. Early in 1998, Elisabeth Axel, president of Art Education for the Blind (AEB), began discussions with APH on a collaboration to produce the 22-volume art history audiobook series developed by the AEB staff. An initial agreement was reached for APH to produce three volumes from the set--The Building Blocks of Art, Art of Ancient Egypt, and European Modernism:1900-1940.

Each volume in the series contains a diagram manual with a print and braille introduction, followed by a number of printed reproductions of great art works and tactile graphic representations of each; packaged with this manual is a set of audiotapes which guide the student through the tactile diagrams and provide historical background through narration and music. Also included is a teacher's supplement on disk, which gives a transcript of the audio narration along with suggested activities and extensions. AEB has field tested their work continually throughout its development, involving a wide range of evaluators.

Work during FY 2001. Project leadership was transferred to Technical Research, with Educational Research staff playing an advisory and editorial role. All aspects of editing and pre-production required by APH for volumes. 4 (Art of Africa) and 6 (Art of Ancient Greece) were completed, and volume 4 became available for purchase in late June. Issues over payment for recording work not done by APH have delayed production of volume 5, although all other editing and pre-production are complete on that volume as well.

The Product Advisory Team conducted a survey of purchasers of the first volumes produced to determine how the materials have been used and whether there is sufficient interest and educational benefit to warrant continued production of the series.

Work planned for FY 2002. Final production and packaging work will be done to complete volumes 5 and 6. Based on the determination of the Product Advisory Team, negotiations may be held with AEB for production of three more volumes of the series.

Guided Art Story Tapes (continuing)

Purpose: To produce materials that promote artistic self-expression and are easily accessible to visually impaired students of varying ages

Project staff: Fred Otto, Project Director
Sarah Ballard, Project Assistant
Will Armstrong, Project Assistant
Karen Spitzberg, Author

Background. At the 1998 APH Annual Meeting, Karen Spitzberg, an artist and art instructor at Drew University, approached APH staff with her idea for a product to help blind persons participate in making expressive art. The product idea initially consisted of the following components: a tactile adaptation of a well-known work of visual art, such as "The Dance" by Matisse; an audiotape description of the artwork and a spoken story inspired by it; and a metal board with magnetic pieces in various colors, geometric shapes, and sizes.

Ms. Spitzberg had used her materials with classes of adult students as follows: The students examine the tactile artwork, using the spoken description, to become familiar with its general features. The group then listens to a brief story based loosely on the painting and containing several contrasting events or moods. The narrator then recalls the various moods of the story and asks students to create abstract art depicting those moods using the magnetic pieces on the board. Ms. Spitzberg documented her submission with letters of support and a videotape of blind adults showing their art and praising the experience.

Work during FY 2001. Ms. Spitzberg submitted four story scripts and a Teacher's Manual draft as agreed upon in the contract. Project staff edited the manual and revised the plan for its production to include pictures in print and tactile form, to help illustrate concepts discussed in the text. Field evaluation was being conducted in the beginning of the fall school term.

Work planned for FY 2002. Staff will revise the scripts and teacher's manual as indicated by the field reviews. Needed changes will be conveyed to Ms. Spitzberg and final copy will be prepared; other pre-production details will be handled so the final copy can move into production.

Time for Art (new)

Purpose: To create a teacher's manual that includes guidelines and instructions to teach art activities that are especially appropriate for students who are visually impaired

Project staff: Tristan Pierce, Co-project Leader
Suzette Wright, Co-project Leader

Background. In September 1999, Jean Randles, Kentucky School for the Blind Art Teacher, presented this art manual, written by Gail Showalter, to the APH Product Review Committee and it was accepted. The art manual is targeted to elementary school teachers and is divided into lower and upper elementary activities. With no available project leader to work on this project, it remained on Goal Zero until February 2001 when it was assigned to Suzette Wright and Tristan Pierce.

Work during FY 2001. The Co-project Leaders sent out the original six art activities for field evaluation. The evaluations were returned in April. Results indicated that one activity needed to be revised for safety reasons. All field evaluators felt that additional art activities were needed. The Co-project Leaders and the author agreed to produce a total of twelve art activities accompanied by at least one companion lesson each. In July the author submitted brief summaries of the new lessons. The Co-project Leaders are talking with the Kentucky School for the Blind about having their art classes do the activities so photographs can be taken for the manual.

Work planned for FY 2002. The author will submit the final manuscript. Action photographs will be taken of students performing the art activities for use in the manual. Layout, design, and final editing are scheduled to be completed by January 2002. Product availability is projected for April 2002.

Braille

Braille Contraction Practice Books (new)

Purpose: To provide additional practice in using various contraction groups for students who are learning braille

Project staff: Eleanor Pester, Project Leader

Background. In a recent survey conducted by APH to determine needs in Grade 1 and Grade 2 braille, practice materials for braille contractions were identified as a need for both students learning to read initially using Grade 1 Braille and those using Grade 2 Braille. Research has shown that practice in identification of the contractions increases reading speed and comprehension. These books would offer short stories, lists of words, tips on usage, puzzles, and gamelike activities.

Work during FY 2001. This project was approved by the Product Review Committee. A meeting to refine the product specifications and share ideas was held in late September.

Work planned for FY 2002. Books will be written according to the specifications and prepared for field testing.

Braille Library Books (continuing)

Purpose: To provide braille library books that coordinate with and supplement the skills taught in the braille reading program

Project staff: Eleanor Pester, Project Leader
Carol Roderick, Project Assistant
Suzette Wright, Consultant

Background. Reading is an important tool that helps students in all subjects and individuals in all walks of life. The Institute for Academic Excellence asserts that reading practice helps students of all abilities, builds proficiency, and accounts for differences in students' abilities. It has been recognized that reading practice is just as important for braille readers, so the National Association to Promote the Use of Braille sponsors the "Braille Readers Are Leaders" contest each year to motivate blind students to read. Braille selections, however, are somewhat limited, particularly at the early levels. This project will provide braille practice books for these early levels.

In FY 1999, the project staff identified several people who have developed materials for beginning braille readers, and began working with these consultants to produce books for the kindergarten level. Drafts of approximately 20 books for the kindergarten level were developed by consultants, Lois Harrell from California and Gayle Lamb from Australia and were reviewed by project staff.

Work during FY 2001. Drafts of the library books for the kindergarten level were reviewed. Text was added to complete the books by Gayle Lamb and ideas for using tactile graphics throughout the books were discussed. Books by Lois Harrell were analyzed for content, concepts, and possible add-ons and revisions. The books were grouped by subject matter and type. Thought was given to how well these books correspond to the kindergarten level of the Patterns Revision. It was felt that some would work better with other products being developed. Additional books emphasizing phonics are being reviewed for possible inclusion in the library series.

Work planned for FY 2002. Final selections of the library books for the kindergarten level will be made. Some books will have to be written to provide practice with specific skills and vocabulary introduced in the reading program. Text, graphics, and layout of the books will be completed. Production for field testing will be scheduled to coincide with the introduction of the revised reading program.

Braille Literacy for Older Blind Students (new)

Purpose: To develop a set of braille materials to introduce older blind students both to the skills required for literacy and to Grade 2 Braille

Project staff: Eleanor Pester, Project Leader
Betty Modaressi, Directing Editor/Consultant
Carol Roderick, Project Assistant
Will Armstrong, Project Assistant

Background. As braille bills have become more prevalent and there has been an increased emphasis on the importance of braille literacy, older blind students are being identified who have never fully learned the important skills of reading and writing. Although there are a number of good programs available for teaching braille to adults and even a few for adolescents, all of them are built on the premise that the students already have developed the skills necessary for reading and that they are just learning a new code. Patterns: The Primary Braille Reading Program, developed at the American Printing House for the Blind, has been very successful at teaching children to read braille, but Patterns does not meet the needs of older students whose interests and learning styles are different from children's. Therefore, a new program needs to be developed to better meet the needs of older blind students who have poor or no reading and writing skills.

Articles, research studies, and instructional materials on adult literacy, methods of teaching adult literacy, braille reading and writing, hand movements for braille reading, and methods of increasing reading rates for braille reading were reviewed. An advisory committee was formed with teachers who have called requesting materials to teach literacy to older blind students, master teachers identified earlier during field testing and visits to observe prototypes in use, and recommendations of trustees. The committee met in March of 2000 to develop product specifications for these materials. A directing editor for the project was selected and a team of writers was assembled. Development of project materials was initiated.

Work during for FY 2001. Writing on the materials for this project was divided into strands to allow more than one writer to work on the project at the same time and to take advantage of each writer's strengths. During the year the strand introducing the braille alphabet and contractions was almost completed, and at least half of the phonics stand was completed. To build background for their writing, consultants met at APH, toured the facility, and spent time talking to blind employees about problems adults who are blind have, and activities people who are blind enjoy in their leisure time.

Work planned for FY 2001. The draft of the program will be completed. This will include development of the braille writing strand and introductory lessons and completion of language activities as needed.

Grade 1 Braille Needs Survey (Children) (completed)

Purpose: The purpose of this study is to determine the need for and most appropriate materials in Grade 1 and Grade 2 Braille for blind children and their parents or adult caregivers

Project staff: Eleanor Pester, Project Leader
Kristopher A. Scott, Project Assistant
Bert Lyons, Consultant
Carol Roderick, Project Assistant
Gene Bolin, Administrative Assistant

Background. In the early 1980's, Marjorie Troughton, a Canadian, began touting Grade 1 Braille as a key to better braille literacy. Recently, there has been renewed interest in Grade 1 Braille instruction with studies based on the amount of space required for Grade 1 rather than Grade 2 Braille and on languages other than English where contracted and uncontracted braille were compared. This survey is expected to accomplish the following: (a) to determine what materials (Grade 1 Braille--uncontracted or Grade 2 Braille--contracted) are being used to teach beginning braille reading; (b) to determine when Grade 1 Braille and Grade 2 Braille materials are being used; (c) to look at the correlations between the teacher's preference and such variables as the number of years taught, the number of children taught primary braille reading, the number of children taught in full inclusion programs, the types of children the teacher has taught, and whether the materials were developed especially for braille or transcribed from print, and (d) to determine what specific Grade 1 Braille and Grade 2 Braille materials are needed for children who are blind and their parents or adult caregivers.

In FY 1999, a questionnaire for teachers of children who are visually impaired was drafted and reviewed in-house by all project leaders and other APH personnel. It was distributed through APH trustees and to members of AER Division 16 (Itinerant Personnel) and AER Division 10 (Education Curriculum).

In FY 2000 responses from 440 returned questionnaires were coded, entered on the computer, and checked. Most of the data from the survey were analyzed with the assistance of Dr. Lyons at the University of Louisville, a professor specializing in survey design and analysis. Work on an annotated bibliography of publications dealing with research, opinion and anecdotal information, and current teaching practices began.

Work during FY 2001. A draft of the major findings was shared and discussed with Advisory Committee members at the Annual Meeting . The annotated bibliography was completed and posted on the APH website. Analysis of the data was completed and a final report on the survey was written.

Work planned for FY 2002. No further work on this project is planned.

Reader's Digest Grade 1 Braille Select Edition (new)

Purpose: To provide ongoing and up-to-date reading practice of interest to older readers who read only uncontracted braille

Project staff: Eleanor Pester, Project Leader

Background. More materials in uncontracted braille have been needed for quite some time. Since older, adventitiously blinded readers usually begin reading braille by learning the letters, additional practice reading materials in Grade 1 Braille could benefit quite a large number of people. Additional practice could help these new braille readers develop fluency and speed. Research shows that older adults, the segment of the population most likely to lose their vision, need more time and practice materials to learn new things. Surveys, including one done within the first two years at APH, show that there is a need for such materials, that some adults will read uncontracted braille indefinitely, and that they would enjoy short selections on the same variety of topics as their sighted peers. Excerpts from Reader's Digest would offer an ongoing source of new reading material and would be familiar to many. This would fill both educational and recreational needs for older students.

Work during FY 2001: This project was approved by the Product Review Committee. APH personnel met and discussed what would be involved in producing a Reader's Digest Grade 1 Select Edition legally and financially as well as the benefits to readers of Grade 1 Braille and the ease of production.

Work planned for FY 2002: Plans will be made to produce a prototype of the Select Edition for evaluation and field testing.

Revision of Patterns: The Primary Braille Reading Program (continuing)

Purpose: To revise and update Patterns: The Primary Braille Reading Program

Project staff: Eleanor Pester, Project Leader
Betty Modaressi, Editor/Consultant
Carol Roderick, Project Assistant

Background. Patterns: The Primary Braille Reading Program was designed to teach reading to children who will use braille as their primary reading medium. It was built on strong reading and braille principles and has remained an effective learning tool since its debut in 1980. In education, where textbooks over five years old are considered outdated, Patterns is now ancient history. Times have changed, and for some years full inclusion has been in vogue, first with whole language and then with phonics playing important roles in reading instruction. Some teachers are having a difficult time justifying use of a program the age of Patterns. Young braille readers, however, still need a firm foundation of beginning braille reading upon which to build. It is the goal of this project to produce an updated and enhanced braille reading program for beginners by building on the successes and philosophy of Patterns.

In September 1997, a Project Advisory Committee met at APH to discuss the revision of Patterns: The Primary Braille Reading Program. Decisions were made regarding features that should be kept, features that should be changed, ways to update the content, and topics that would be of interest to today's visually impaired children. The committee discussed current trends in reading for the general population, some new programs and methods for teaching reading and language arts, and the use of tactile graphics with young children. In 1998, a detailed timeline and budget were developed for this project. Work on a revised prototype of the early levels of the program was begun. An extensive bibliography on the latest literature related to braille reading was compiled and reviewed by project personnel. Current reading programs were also reviewed. In 1999, the basic prototype for the kindergarten level of the Patterns revision was developed, and ideas for supplementary phonics and character development tapes, games, and books were explored. Changes were made in the kindergarten level based on conference sessions, reviews of research, and Project Advisory Committee recommendations. The 1st grade level was drafted. New approaches to teaching reading continued to be investigated.

Work during FY 2001. Work continued on the kindergarten and 1st grade levels. In an effort to follow the latest research and current trends, all letter words, letters, consonant sounds, short vowel sounds, and the part words and, for, of, the, and with were taught. Word patterns were used to show children how to use their knowledge of sounds and letters to make words that they can read (decode), and the decodable words were used in context. Contrived and out-of-date stories were replaced with stories that have more natural sounding sentence patterns. Efforts were made and continue to be made to find already published stories that can be transcribed into braille and included in the pupil texts. So much of the early material relies heavily on illustrations that this is difficult. More varied activities were added so that all of the worksheets will not have the same fill-in-the-blank format. Some part words such as and were

used in word patterns--sand, hand, land, and so on to make more decodable words. Activities overemphasized in the previous edition such as "Wh-questions" and "Question Transformation" were reduced and replaced. Things that were taught incorrectly such as to uncontracted and cannot used as can and not instead of the shortform cannot were eliminated.

Work planned for FY 2002. The kindergarten level will be prepared for production for field testing. The 1st grade level will be completed and work will continue on the 2nd grade level.

Word Associations: Print Braille Labels (formerly entitled Tactile Word Associations) (completed)

Purpose: To familiarize young blind children with braille by putting labels on familiar items in their home environments

Project staff: Eleanor Pester, Project Leader
Lois Harrell, Product Developer/Consultant
Carol Roderick, Project Assistant

Background. This project is a redesign of a product developed by Lois Harrell. Originally, the product consisted of a set of clear crack-and-peel braille/print labels and a thermoform reference list in a booklet with information about the use of the labels printed inside the front and back covers of the booklet. Through the years, this product had unknowingly and mistakenly been changed so much that only the thermoform reference list in the booklet remained--without the information on the covers and the crack-and-peel labels.

This product was reviewed in-house, where it was deemed worthwhile but in need of both restoration and updating. The project leader worked with the product developer on a revision of the word list and information originally printed inside the covers. Plans for the redesign include putting this material in a separate print or braille booklet as the text proper rather than inside the covers. It was also decided that computer-generated simulated (inkprint) braille would be used for the reference list at the back of the print booklet in place of the thermoformed braille reference list. A set of crack-and-peel braille/print labels will once again be included with this product.

The text and wordlist were reviewed by several experts, and the wordlist was finalized using suggestions from the reviewers. Since the idea of familiarizing young children with braille before they are expected to begin reading is a long accepted idea that the product developer has been using with young children for a number of years, and because the redesign does not affect the use of the product, further field testing or review was determined to be unnecessary. The cover was given a new look. A timeline for this project was developed, and revisions and new production specifications were finalized at a Product Development Committee meeting in September with Lois Harrell, product developer, in attendance. Most tooling will be done for braille and print versions from the disk furnished by the product developer. Production of the item was scheduled.

Tooling for the print version of the guidebook and labels was completed and transcription of the braille was begun. The new product will be called Word Associations: Print/Braille Labels.

Work during FY 2001. Production was completed and Word Associations of Print/Braille Labels was made available.

Early Childhood

Babies Count: The National Registry for Children with Visual Impairments, Birth to Three Years (formerly Registry of Early Childhood Visual Impairment) (continuing)

Purpose: To develop a national research database providing information on incidence, geographic location, and cause of visual impairment in children birth to three years of age

Project staff: Judy Parks, Project Leader
Monica M. Coffey, Project Assistant
Larry Skutchan, Software Design
Bridgette Johnson, Brochure Design
Sandy Jeans, Form Design

Background. APH began planning for the project, *Babies Count: The National Registry for Children with Visual Impairments, Birth to Three Years* in August, 2000. Although the majority of practitioners in the field of visual impairment agree that early intervention is a key factor in the successful development of environmental awareness, independent living, academic, and vocational skills, there is little research available to validate this position. Early identification, referral, and appropriate intervention can facilitate not only vital service delivery but can lead also to useful research for planning responsive family service and personnel training programs, and for identifying priorities related to product development. Currently, there is no national mechanism for collecting and disseminating data to facilitate this research.

The Babies Count project is based on the work of the *Model Registry of Early Childhood Visual Impairment Collaborative Group* whose names appear under that heading in the Appendix of this document. Their work evolved from information presented by the Blind Babies Foundation at an International Preschool Seminar for Blind Children in Boston in 1995. With financial assistance provided by the Hilton Perkins Program, this group developed a model which was initiated in nine states and a Canadian province. Data was collected and processed by the Utah School for the Deaf and Blind, and analyzed by Dr. Deborah Hatton at the University of North Carolina at Chapel Hill. Preliminary data was shared at the *Association of the Education and Rehabilitation of the Visually Impaired* (AER) conference in the summer of 2000, and published in the July 2001 edition of *Journal of Visual Impairment & Blindness* (JVIB). APH agreed to assume responsibility for coordination and expansion of the project, and in September 2000, hosted a transition meeting to help with data form review, state and state coordinator designations, project timeline formulation, and continuing data collection and analysis procedures.

Work during FY 2001. Data form development and project planning continued and, in January, APH hosted a second meeting to finalize implementation plans and provide directives for the eight newly identified states. Those attending are listed under *Babies Count* in the Appendix of this document. Form refinement continued, planning began for development of data processing software with the APH Technology Project Leader and brochure development planning was initiated. The data form was completed and printed, and shipment to participating states began at the end of April. Data forms are being returned to APH for processing and

software refinement is continuing. Brochure development and printing was completed in September and dissemination began. An in-house language processing session was held in July to identify areas of concern and plan for appropriate expansion. The top four, time-sensitive priorities were determined to be:

- Hire adequate staff;
- Identify state contact persons for non-participating states;
- Develop four, one-year action plans; and
- Determine appropriate administrative placement at APH

Work planned for FY 2002. Work conducted in FY 2002 will focus on overall planning for effective project continuation and expansion and on completion of appropriate software design for collection and dissemination. Identification of additional states to be added in this fiscal year will occur, along with continued form and brochure dissemination and data processing. Work with Dr. Hatton at UNC at Chapel Hill for data analyses will continue. Issues clarified in the language processing session in July will be considered and resolved.

Early Childhood Needs (continuing)

Purpose: To develop early childhood materials, projects, and services appropriate to the mission of APH and responsive to the needs of the field

Project staff: Judy Parks, Project Leader

Background. The current Early Childhood Project Leader began work at APH in August, 2000. The position assumed halftime coordination of the *Registry of Early Childhood Visual Impairment*, (renamed *Babies Count: The National Registry for Children with Visual Impairments, Birth to Three Years*), and the Project Leader began work on two continuing early childhood projects, *Reach for the Stars: Planning for the Future, Braille Edition,* and the *Preschool Activities Calendar, Braille and Large Print Edition*. Effort was made to understand APH history, mission, organization and product line and to incorporate early childhood program goals into existing structure, cooperating with staff already working on early childhood projects, and forming collaborative working relationships with those project leaders whose areas of endeavor overlap with that of early childhood.

Work during FY 2001. In addition to continuing to work on projects noted above which are outlined in following entries, two new products, *The Toy Box*, a kit of assessment items to accompany *ISAVE*, and *What Is It?*, an educational game to enhance comparative thinking and generalization skills have received PRC approval, and await removal from Goal 0 status, (renamed Holding Cell).

Following the Babies Count planning meeting at APH in January, an abbreviated language processing session with early intervention, visual impairment, and early childhood. leaders resulted in identification of assessment as the leading priority for research and product development in the area of early childhood. Contacts related to early assessment initiatives were forwarded to *Test Central,* and the Early Childhood Project Leader will collaborate with this new APH program on the *CAS* and related products. (Discussed under *Test Central.*)

During FY 2001, the Early Childhood Project Leader made six presentations, one with Suzette Wright on the APH product, *Lets See*, and five on *Babies Count: The National Registry for Children with Visual Impairments, Birth to Three Years.*

Also during FY 2001, the Project Leader initiated a move toward APH focus on Cortical Visual Impairment (CVI) as an area needing further research, particularly as it relates to literacy issues. A collaborative effort with Braille, Low Vision, and Multiple Disabilities Project Leaders resulted in a national discussion group meeting, *CVI Synergy,* at APH in September. Composed of leaders from the field working with CVI students, representatives from educational, O&M, assessment, and medical perspectives met with APH staff to review existing materials, suggest research directives, and help APH to determine related short term and long range goals.

Work planned for FY 2002. During the coming year, the Early Childhood Project Leader will continue coordination and development of the projects and products delineated above.

There are also several new product suggestions requiring additional research, and approval, including *Tray Chic*, contrasting color, non-skid, washable APH work tray mats; *Hooked on Phonics Too*, an accessible version of the successful commercial product; *Act and React*, an interactive software to teach keyboarding and enhance pre-literacy task skills; and *My Space, My Place*, a multi-media book/ light box series to help students develop O&M, locus of control, self esteem, and social awareness skills and concepts so necessary for early independence. Additional input regarding new products and research needs will continue to be sought from Ex Officio Trustees, related conference participants, and colleagues and consumers in the field.

IntelliTactiles: Standard Overlay Companions (formerly IntelliKeys® Research: Phase I) (Completed)

Purpose: To develop educational activities and companion tactile overlays (for use with the IntelliKeys adaptive keyboard) that are appropriate for visually impaired students, especially those with multiple disabilities

Project staff: Karen J. Poppe, Project Leader
Kristopher A. Scott, Project Assistant
Tom Poppe, Pattern and Model Maker

Background. IntelliKeys is a commercially available keyboard for use with Macintosh, IBM-compatible, and Apple II platforms. For customized settings, the keyboard comes with six standard overlays that feature alternative keyboard designs, simplified keyboard arrangements, high contrast colors, and large keys.

Initial efforts by the project leader were focused on reviewing and becoming familiar with the limitations and inconsistencies of the authoring software and keyboard as documented by the former project team. Based upon information and reviews garnered from the field, the project leader identified a need for tactile companion overlays to enhance IntelliTools' six standard overlays for use by visually impaired students, especially those with multiple disabilities. The project staff proceeded to design a prototype of a clear tactile overlay for IntelliTools' standard Alphabet Overlay; the prototype was shared with some individuals in the field who had requested such an adaptation and positive feedback was received. The "tactile companion overlay" idea was presented and given support by APH's Product Review and Executive Committee members.

The IntelliTactiles project received federal funding as a special initiative in FY 2000. The project leader secured formal permission from the President and CEO of IntelliTools to produce clear tactile overlays to accompany the standard print overlays packaged with the commercial keyboards. The project shifted to the active timeline, and overlays for evaluative review by the field were rendered by the project staff.

Six tactile overlays to register with IntelliTools' Alphabet Overlay, Numbers Overlay, Arrows Overlay, Basic Writing Overlay, and Apple QWERTY Overlay were designed by the project staff. Many decisions were made about the tactile presentation, labeling method, and braille abbreviations applied to the companion overlays. A durable, clear rigid vinyl was selected as the ideal material for the overlays. Thermoform patterns were built to generate prototype sets of the overlays. Folders, identical in design to those that house commercially available IntelliTools overlays, were prepared to hold the six overlays and an accompanying "Instruction Booklet."

In March 2000, twelve complete sets of the companion overlays were mailed to field test evaluators in Pennsylvania, Louisiana, Illinois, Kentucky, California, Indiana, Iowa, Kansas, and

Texas. The overlays were used with thirty-seven students who were predominantly braille readers, many of whom had additional handicapping conditions. Teachers praised the overlays' tactile quality, ease of use, durability, appearance, alignment of tactile overlays with visual overlays, and general usefulness. Necessary revisions, as determined by the Project Review Committee, included a labeling system for the print reader to identify the tactile overlays, an enhanced logo for the front cover of the folder, more specific instructions to ensure proper auditory feedback when keys are pressed, and the development of a tactile overlay companion for IntelliTools' "Setup Overlay." The product was a approved for quota funds by the Research and Development Committee.

Work during FY 2001. The final documentation for the "User's Guide" was written by the project leader; needed tooling for the thermoformed overlays was prepared by the Model/Pattern Maker; and the artwork for the housing folder, as well as guidebook cover, were created by the in-house graphic designer. The project leader met with the Accessibilities Committee to determine accessible formats for the guidebook; it was determined that both large type and braille versions of the guidebook would be sold with the overlays. The project leader also located an outer clear-view folder that would house and protect both the overlays and the guidebooks. The product specifications were finalized and distributed to the Product Development Committee in November 2000. The pilot and production runs of *IntelliTactiles: Standard Overlay Companions* were completed on schedule in March 2001. The project leader assisted in preparing promotional materials, including a flyer specifically designed for and distributed by IntelliTools, Inc. with each sold IntelliKeys board. The product was also showcased at summer conferences and workshops.

Work planned for FY 2002. The availability of *IntelliTactiles: Standard Overlay Companions* officially completes Phase I of the IntelliKeys Research project. The project leader will continue to demonstrate the use of the overlays at workshops, answer customer questions about the product, and use the knowledge acquired during the initial phase of the project to plan the design features of *IntelliTactiles: Pre-Braille Concepts* [see separate report].

IntelliTactiles: Pre-Braille Concepts (formerly IntelliKeys® Research: Phase II) (continuing)

Purpose: To develop educational activities and companion tactile overlays for use with the IntelliKeys adaptive keyboard that introduce and reinforce pre-braille concepts

Project staff: Karen J. Poppe, Project Leader
Gerald Abner, Project Consultant
Kristopher A. Scott, Project Assistant
Tom Poppe, Pattern and Model Maker
Bernadette Mudd, Graphic Designer

Background. The original goals of the former "IntelliKeys Research" project, now a specially funded new initiative, were modified to reflect two stages of development. While the first phase of the project encompassed efforts to create tactile companion overlays that make IntelliTools' standard print overlays accessible to visually impaired and blind students [see separate report on *IntelliTactiles: Standard Overlay Companions*], Phase II broadens to include more challenging goals of creating original overlays that introduce and reinforce pre-braille concepts.

The Project Leader gathered overlay ideas for the IntelliKeys adaptive keyboard appropriate for visually impaired students from two primary sources including 1) the Tactile Symbol Planning Committee [see separate report on Tactile Symbol Communication System] and 2) reviewers of the *IntelliTactiles: Standard Overlay Companions*. Based upon the input from these two primary sources, the project leader narrowed the focus of the project to address O&M, prebraille, and reading skills.

In June 2000, the Project Leader met with Gerald Abner, Assistive Technology Specialist, at a local workshop for teachers of visually impaired students. Mr. Abner demonstrated working knowledge of the IntelliKeys board and shared overlays he personally designed and programmed. After discussing the goals of IntelliTactiles: Phase II, and discussing a collaborative effort with APH project staff, Mr. Abner signed a contractual agreement to assist in developing software and overlays for young visually impaired and blind students.

The Project Leader sketched a number of tactile overlay designs that addressed pre-braille skills including shape discrimination and texture recognition. These overlay sketches were provided to the consultant to program quizzes using the IntelliTools authoring software. In mid-September, an example of a pre-braille overlay was demonstrated to APH's Product Review Committee (PRC). The PRC approved the product for development.

Work during FY 2001. The Project Leader fine-tuned the design and layout of the pre-braille overlays before asking the Project Consultant to prepare quizzes to correspond with each. Planning the overlay designs involved 1) selecting proper placement of the shapes given the grid limitations of the keyboard; 2) choosing and incorporating a variety of materials to ideally represent smooth, soft, bumpy and rough textures; 3) designing the overlays in a way to assess a

variety pre-braille concepts; 4) selecting high-contrast colors for the overlays; and 5) insuring ideal elevation in the thermoform shapes for young tactile learners. The tactile overlays planned are titled:

1) Texture Recognition I Overlay
2) Texture Recognition II Overlay
3) Four Shape Overlay
4) Six Shape Overlay
5) Nine Shape Overlay
6) Texture/Shape Recognition Overlay
7) Braille Cell Overlay

These overlays introduce and reinforce a myriad of concepts such as above, below, left, right, between, next to, square, triangle, circle, star, rough, smooth, soft, bumpy, row, column, etc. The "Braille Cell" overlay even provides early orientation to each dot position in the braille cell configuration.

Once the layout of the overlays was determined, thermoform patterns were built by the Pattern and Model Maker and several copies were generated for testing purposes. A "quiz" script for each overlay was composed by the Project Leader and the Project Assistant; these scripts were used by the Project Consultant to prepare recorded versions using IntelliTools software. The Project Consultant also designed visual graphics to appear on the computer screen when the child selects correct answers. The in-house Graphic Designer created cover art for the housing folder and guidebook cover by reassigning a new color (purple) to the existing artwork used for the *Standard Overlay Companion* package. By late July, the only task remaining to prepare a full prototype was the writing of the accompanying guidebook.

Work planned for FY 2002. Ideal field test sites will be located and input from evaluators will be used to determine necessary revisions to the overlays. Revisions will be implemented and the software and overlays will be readied for initial production runs set for second quarter of FY 2003.

Moving Ahead: Storybooks for K-2 (new initiative)

Purpose: To develop braille/print storybooks for upper preschool, kindergarten and first grade students featuring tactile illustrations designed to encourage tactual exploration, refine tactual discrimination, and introduce tactile symbols, simple keys, maps, and charts in the context of a story

Project staff: Suzette Wright, Project Director
Frank Hayden, Project Assistant

Background. Visual displays, such as maps, graphs and diagrams play an increasingly important role in textbooks and computer displays for students with typical vision. The current trend is to begin instruction in reading these types of visual displays early: simple graphs, maps and symbols are a part of kindergarten curricula for sighted students. This presents a special challenge for the student with significant vision loss. Observers have suggested the difficulty many learners experience in interpreting tactile versions of these visual displays may be due, in part, to a lack of exposure. The books developed in this project will provide young students with opportunities to explore and interpret tactile illustrations featuring symbolic representations of story elements, to notice increasingly refined tactual detail, and to track lines of varying types, including intersecting lines. Simple keys, maps and charts are featured in some stories. The text of the books will be primarily read aloud by an adult reader, allowing the adult reader to guide the child's exploration and interpretation of the story's tactile displays. Some reading opportunities for the child will also be featured for students who are beginning to read large print, contacted braille, and uncontracted braille.

The project received federal funding as a special initiative for FY 2000. Project staff researched the literature concerning the materials to be developed, objectives, and possible story texts to support these. Ideas for texts and the opportunities for skill development each afforded were organized and presented to expert reviewers. Initial objectives and story texts included some that focused on tracking braille lines and discrimination of braille letters. Input from expert reviewers affirmed the primary purpose of the books as introducing symbolic tactile displays, supported by the context of a story. Story drafts were selected/rejected on the basis of this input.

Work during FY 2001. Lois Harrell agreed to serve as project consultant; she reviewed proposed storybook drafts and authored two storybook drafts. In order to portray the fine detail required by some books, a variety of tactile media were considered. The Tactile Visions process was selected for two books. Sample illustrations were presented to blind adult reviewers to obtain specific recommendations before actual prototyping. Final art and print/braille text was completed for these two titles, however difficulties identifying a suitable paper stock delayed prototyping of the books. Final text for an additional 7 books has been completed; these are being reviewed and final art is being prepared. These prototypes will reflect a sampling of different tactile media: raised lines in embossed paper, thermoformed plastic, and silkscreened inks and applied adhesive tactile symbols.

Work planned for FY 2002. All prototyped books will be evaluated with students and their teachers. Information gathered during the field evaluation will be analyzed and revisions made. Documentation for production of the books will be provided and production of the books will be scheduled to flow as efficiently as possible based upon the final number of books and processes involved.

On the Way to Literacy Series: APH SoundPage (continuing)

Purpose: To develop an accessory for On the Way to Literacy storybooks that would add a sound component to the books

Project staff: Suzette Wright, Project Leader/Consultant
Frank Hayden, Project Assistant

Background. Storybooks featuring pre-recorded sounds have been a popular addition to commercial children's books. The sound is played back as the story is read, adding both interest and meaning. The APH SoundPage has been created to add similar interest and meaning to the *On the Way to Literacy* storybooks developed and produced by the American Printing House for the Blind. For some time, evaluators of these books have requested that electronic chips with pre-recorded sounds be added to this series, giving the child benefit of both tactile and auditory input as the book is read. However, high minimum order quantities made it difficult to provide appropriate, pre-recorded sounds for each book. To resolve this obstacle, the APH SoundPage was designed to make use of a commercially available digital recording device which has the capability to record, store, and playback any eight-second message, musical clip, or combination of sound effects. The reader or child selects and records messages or sounds appropriate to the story being read. Because the recording is created by the reader and may be changed at any time, the APH SoundPage may be used with all of the books in the *On the Way to Literacy* series and offers the possibility of other uses in the home and preschool classroom. The APH SoundPage features a thermoformed plastic page which "houses" up to three digital recording devices: the devices slide securely into molded slots. The page is designed to easily slide into and clip to the three-ring binder of any of the *On the Way to Literacy* storybooks. A user's guide was written to provide operating instructions and suggest ways to introduce and use the SoundPage with students.

Work during FY 2001. Field evaluation of the SoundPage and user guide was completed. Evaluators commented that the SoundPage improved attention span, helped students focus, provided something new each time a book was read, and added the enjoyment of planning, recording and listening to audible messages. Evaluators had no difficulty recording or playing back messages, and found the recording quality was high—even whispers could be heard. Based upon evaluators' requests, it was decided to sell the SoundPage with two recording devices. Additional devices will be made available as a separate purchase. The accompanying user guide was expanded to include suggestions for using the recording device in other applications at home and in the classroom. Product specifications for the SoundPage were completed; tooling was prepared, and the first run of thermoformed pages has been accomplished. Negotiations with the vendor of the recording device have resulted in a lower minimum order quantity and packaging which will lessen in-house labor. Shipment of the order is expected in October.

Work planned for FY 2002. Print and braille copies of the user guide will be run. The APH SoundPage components (thermoformed page, two recording devices, large print and braille copies of the user's guide) will be packaged. A cost will be established and the product will be stocked and advertised.

On the Way to Literacy Series: *Alphabet Scramble* (continuing)

Purpose: To provide additional tactile/visual storybooks as requested by evaluators of previous books of this type. The books feature text in braille and large print and provide both tactile and visual illustrations; the books are designed to be read aloud by an adult to preschoolers who are blind or visually impaired

Project staff: Suzette Wright, Project Leader/Author/Consultant
Frank Hayden, Project Assistant

Background. At the close of On the Way to Literacy III, evaluators of Alphabet Scramble requested it be produced; their assessment of students' interest in the book, however, was not as high as for other books in the set. Younger students and print reading students, they felt, were accustomed to more exciting tactile and visual graphics provided by other books in the On the Way to Literacy series. Alphabet Scramble provides exposure to single lines of braille letters accompanied by a rhyme for each containing the corresponding letter word. A redesign and re-evaluation of the book was indicated.

The addition of a recordable sound chip began to be explored as a means to add interest to the book. Advice was sought from expert reviewers, and the book's text and graphics were rewritten to incorporate varied spacing between letters progressing in difficulty. Development of the sound chip was separated from Alphabet Scramble's redesign to keep the book's focus on braille tracking. Alphabet Scramble was mailed out for evaluation; six evaluators returned teacher questionnaires indicating the book should be produced. All but one evaluator agreed the book would benefit potential braille readers in kindergarten through second grade. Four evaluators responded the book was interesting and appropriate for this target audience, but two disagreed, indicating the book was more suited to preschool, kindergarten, and perhaps first grade. Unfortunately, far fewer child data forms were returned than was anticipated and it was not possible to assess teacher's impressions of individual student's responses to the book. This absence of data made it difficult to determine if the book needed further modifications. Additional expert reviewers have been contacted in an effort to determine the book's true target audience and the value of the book for this audience.

Work during FY 2001. The data received from field evaluation and expert review of Alphabet Scramble were reviewed and a decision was made to evaluate the book with additional students in kindergarten and first grade placements. Some expert reviewers suggested the book's approach and repetition of braille letters might serve the needs of some students with multiple disabilities learning to read braille.

Work planned for FY 2002. Evaluate the book with students in K-1 placements and with students with multiple disabilities.

On the Way to Literacy Series: *The Littlest Pumpkin* (completed)

Purpose: To develop additional storybooks in the On the Way to Literacy series as requested by evaluators of previous books of this type. These tactile/visual storybooks are designed to be read aloud by an adult to preschoolers who are blind or have a significant visual impairment. The storybooks provide text in braille and large print, offering critically important exposure to written language; visual and tactile illustrations accompany the text to add meaning and interest and provide a progression of types of tactile graphics

Project staff: Suzette Wright, Project Leader/Consultant/Author
Frank Hayden: Project Assistant

Background. Field evaluation of storybooks in the On the Way to Literacy series has drawn favorable responses from preschool students and their teachers. Development of additional tactile/visual books was requested by these evaluators and recommended by the Research and Development Advisory Committee. The shared experience of reading aloud offers a child exposure to written language in a meaningful context, providing opportunities to learn about the conventions of written language and instilling a desire to read. The On the Way to Literacy storybooks provide a read-aloud story in a format which can be accessed by the sighted adult reader and the young child with significant vision loss. Simple tactile graphics and colorful, bold visual illustrations add interest and meaning to the story, which is centered around concepts that can be experienced firsthand by a young child with visual impairment. Late in fiscal year 1998, a survey of children's books was conducted to identify stories suited to the On the Way series. Classic children's tales, rhymes, and songs were examined; annotated bibliographies of commercial children's books compiled during previous On the Way to Literacy projects were reviewed. A search was made of current children's books. Three commercial stories were selected for tactile adaptation; and three original stories were written. Work on the project was suspended, pending the hire of a project leader in Early Childhood. Work resumed in August 1999 when the project author agreed to assume responsibility for leading the project. It was recommended to the project leader that one book be selected for development, rather than continue to develop books in sets.

A formal timeline and budget for the project was agreed upon and approved. Texts of the stories already identified were prepared for distribution to five expert reviewers together with sketched illustrations; input gathered through a questionnaire was used to select one story for development. *The Littlest Pumpkin* was rated highly by all evaluators and was chosen to be prototyped for field evaluation. Its illustrations feature life-size pumpkin shapes (big, small, triangle "eyes," round "nose," smile) die-cut from orange sheet foam as well as simple raised line drawings of a child's hand and foot. In the spring of 2000, nine teachers completed questionnaires and 19 child data sheets were returned. In response to the question, "Is this story's text interesting and appropriate as a read-aloud story for the target audience (visually impaired students functioning from 2 1/2 years of age up to kindergarten level)?"—all teachers responded "yes." Comments included "Very interesting and appropriate!" and "No changes--great story!" When asked whether APH should produce the book, all teachers responded "yes."

One commented, "Absolutely--it is the best yet!" Students for whom child data sheets were completed ranged in age from 2 years/4 months to 6 years/1 month. Among the 19 children, 11 were listed as potential braille readers; three were listed as potential print readers; four were described as potential users of both print and braille; one was described as "visual, but may not read at all." Four students had additional disabilities. Thirteen students were assessed by their teachers as being "very interested" in the book. Of the students who demonstrated less interest, analysis shows these were among the very youngest students in the group, had additional disabilities, or were potential print readers. Final specifications for production have been prepared and necessary tooling arranged. All materials from outside vendors have been supplied for in-house brailling and assembly of the book's first run.

Work during FY 2001. Remaining work on the book's first run was completed and it was placed in stock for ordering.

On the Way to Literacy Series: The Littlest Pumpkin Puzzle Set (completed)

Purpose: To develop puzzles to complement The Littlest Pumpkin, an On the Way to Literacy storybook; activities with the puzzles allow students to explore three-dimensional representations of shapes introduced in the story, adding to its meaning and interest

Project staff: Suzette Wright, Project Leader
Frank Hayden, Project Assistant

Background. It is increasingly common to find commercial books for typically sighted children accompanied by toys and other accessories related to the story. Holding a stuffed toy of the story's character can add interest for a young child and offers opportunities to extend the story meaning and the child's understanding. Although it is suggested in the On the Way to Literacy handbook and the "Let's Get Started" booklet that objects related to the stories be gathered and used before and during story reading, it has been left to readers to supply their own materials. The Littlest Pumpkin introduces both geometric and pumpkin shapes, which can be further explored through puzzles of the story's characters. Puzzles may be cut from the same materials used to create the book's illustrations, duplicating the textures found there. Since it would not be possible for a reader to easily construct such a puzzle, it was proposed the puzzles be developed at APH, produced, and made available for use with the book.

A formal timeline and budget for development of the book and puzzles was agreed upon and approved. Puzzles are ½ inch thick, made of bright orange sheet foam and black, textured Tactilmat. They measure 10.5 by 9.5 inches and all pieces pass small parts evaluation for choking and swallowing hazards. In the spring of 2000, nine teachers completed questionnaires and 19 child data sheets were returned. Students for whom child data sheets were completed ranged in age from 2 years/4 months to 6 years/1 month. Among the 19 children, 11 were listed as potential braille readers; three were listed as potential print readers; four were described as potential users of both print and braille; 1 was described as "visual, but may not read at all." Four students had additional disabilities. Fourteen students were assessed by their teachers as being "very interested." Two puzzles were created to provide opportunities for children to explore the geometric and pumpkin shapes featured in the storybook. It was decided to sell the puzzles as a set, available as a separate product from the book itself. Specifications for production have been prepared and necessary tooling arranged. All materials from outside vendors have been ordered.

Work during FY 2001. The first run of the puzzles was completed and the puzzle set was ready for separate ordering.

Work planned for FY 2002. This project has been completed.

Preschool Activities Calendar, Braille/Large Print Edition (continuing)

Purpose: To develop an accessible media version of *the Preschool Activities Calendar* for blind and visually impaired family members and professionals to use with preschool populations

Project staff: Judy Parks, Project Leader
Bernadette Mudd, Project Materials Design
Frank Hayden, Technical/Production Assistant

Background. *The Preschool Activities Calendar: Everyday Exposure to Experiences for Enjoyment* outlines a variety of learning activities, one for each day of the year. Experiences were designed to enhance environmental awareness for young, visually impaired children or multiple disability populations in home or preschool settings. Authored by Nancy Smith at the Wisconsin Department of Public Instruction, the product was received, field tested and published by APH in small print. It was determined by the Accessibility Committee to be appropriate for Braille and large print production and was assigned to a consultant for work on Braille and large print formats. Subsequent cost analysis suggested that additional planning and design might help to reduce cost to a marketable level, so the product was assigned to the new Early Childhood Project Leader for completion. Product review and editing for appropriate modifications that would result in an affordably priced edition of this product were begun.

Work during FY 2001. An outline of the activities needed to complete these editions was prepared and a time line was established. It was determined most feasible and cost effective to combine Braille and large print in one edition and to publish it in a three ring binder format from which pages could be easily removed for copying. Editing and design activities, and Braille and large print production of an abbreviated prototype were completed, field reviews were conducted, and revisions were finalized. A meeting was held to adjust time line dates for more realistic production completion.

Work planned for FY 2002. Formatting of remaining months, and graphics for divider pages should be finished early in FY 2002 and Braille and large print production, and collation, should be complete by mid-year. Following production, promotional materials will be developed, and suggested improvements incorporated into subsequent production runs.

Reach for the Stars: Braille Edition (continuing)

Purpose: To provide an accessible version of *Reach for the Stars: Planning for the Future* for blind family members and professionals to use with early childhood and preschool transition activities from home-based to center and school programs

Project staff: Judy Parks, Project Leader
Bernadette Mudd, Project Materials Designer
Frank Hayden, Technical/Production Assistant

Background. Reach for the Stars: Planning for the Future, developed by Jennifer Grisham Brown, Ed.D and Diane G. Haynes, M.Ed., outlines client-centered activities for successful movement of children with visual and/or multiple impairments from home to group settings. In FY 1999, the print version of the product was field tested. Modifications based on field test results were made. APH's Accessibility Committee recommended that *Reach for the Stars* be made available in large print and braille. Planning activities for required modifications for the large print version were completed, and the large print version was made available in FY 2000. A project consultant was given the task of editing the large print version for presentation in braille. When the new Early Childhood Project Leader joined the Educational Research Department in August of 2000, this task was assigned to her and review for braille modifications was initiated.

Work during FY 2001. The project leader completed planning braille modifications, and editing, and worked with Technical Research and Production staff to develop a feasible timeline for release of the braille edition of *Reach for the Stars*. The print version was discussed in detail with two braille users prier to braille modifications and will be reviewed again by them when the prototype is complete to ensure readably and usability in the braille format. Graphics and Braille files have been completed and production/collation of this small run will be worked into the production schedule at the earliest possible date (projected, October).

Work planned for 2002. Following production, public information materials will be developed. Should a second production run be needed, the product would be reviewed again to incorporate any needed changes.

Rolling Right Along Series (Book 1: *Rolling Into Place*) (new)

Purpose: To develop a storybook design that develops tracking skills and spatial understanding needed by young children with visual impairments and blindness

Project staff: Karen J. Poppe, Project Leader
Jane Kronheim, Product Consultant/Author
William W. Armstrong, Project Assistant
Tom Poppe, Pattern and Model Maker
Bernadette Mudd, Graphic Designer

Background. In October 2000, the Product Developer was invited by APH's Product Review Committee (PRC) to share some of her product ideas and original handcrafted items appropriate for an early childhood population. From the many items shown (samples of which were given to the PRC Chairman for further review), the Project Leader saw potential in a Velcro®-path covered storybook for developing children's tracking skills and early understanding of spatial relationships. The book serves to accelerate the acquisition of hand skills needed by young children with visual impairments and blindness by encouraging them to search in a systematic manner (left to right, top to bottom), discriminate between various textures (smooth, rough, soft), to interpret simple map displays, and to discern sound differences. These skills can be learned incidentally as the child guides a Velcro-covered ball along maze-like paths to its final destination. The noticeable sound produced by the "traveling" Velcro ball assists the child to keep the ball on course as it travels from page to page. Beyond the obvious tactile skills addressed through the book's format, a wealth of basic educational, spatial and directional concepts will be reinforced; language skills will also be enhanced as the child actively describes the movement of the ball as it shifts directions.

In November 2001, the PRC approved the product for development.

Work during FY 2001. Initial tasks were focused on developing a contractual agreement with the product developer. Concurrent with contract preparation, the project leader investigated ways to enhance the product's design and presentation; her first recommendation to the Product Developer was to write a simple story to accompany the Velcro paths that lead to her "surprise ending"—the ball becoming a nose on a face. The Project Leader created an early mock-up of the book using clear proprionate covered text pages instead of the double-foam, Velcro-secured pages used by the Project Author. The Project Leader also wanted to give the book (and expected series) a defining look by actually incorporating the Velcro ball as part of the cover itself. With more thought, the Project Leader changed the original 3-hole punched pages (for inclusion in a ring binder) to a more producible and functional accordion-folded panel; this format resulted in a game board appearance that allows the ball to travel more smoothly from page to page. After garnering further product design feedback from an in-house committee, the Project Leader and Project Author decided it best not to add print and braille text to the "path" pages in order 1) to minimize the visual and tactual distractions for the child, and 2) to avoid

cumbersome placement of the braille and print around the Velcro paths. The decision was made to provide a cassette version of the short poetic story instead.

In May 2001, the Product Development Committee was familiarized with the product and a time line was determined; September 2002 was slated as the expected "Availability" date. In June, the project staff began preparing twelve full copies of the prototype for field test purposes. Tasks included the following: 1) having the in-house graphic designer create cover art for the book and a new design for the face where the "nose" lands; 2) having several narrations of the story read by young children and a professional adult reader; 3) designing face accessories (i.e., glasses, ears, eyebrows, and hair bow/bow tie); and 4) preparing a "Letter from the Author" that details the purpose of the book. By August 2001, multiple sets of the prototype were complete.

Additional work included locating possible vendors for the Velcro ball and brainstorming possible packaging ideas, such as a clear clamshell case to hold the book, cassette, face decorations, and accompanying documentation. An evaluation packet was prepared by the Project Leader and Research Assistant and mailed to ten field reviewers in early September.

Work planned for FY 2002. Modifications will be made to the book based upon evaluative reviews. Final product specifications will be prepared and production tooling will be built. Outside vendors for specific items (e.g.,Velcro ball) will be identified as well. The Project Leader will monitor the quality of the pilot and initial production runs in the last quarter of FY2002. Post-production tasks will include assisting in the development of product brochures, showcasing the new product at conferences and workshops, and planning future *Rolling Right Along* books (depending upon field reviewers' feedback on the first book).

Educational Games

Adaptation of Brain Quest: English (Completed)

Purpose: To provide materials for blind and low vision students that will test and expand their knowledge of English through the use of accessible versions of a popular commercial product that will also encourage shared, fun experiences with sighted peers

Project staff: Karen J. Poppe, Project Leader
Kristopher A. Scott, Project Assistant

Background. The debut of the braille and large type editions of *Brain Quest: Science 1000 Questions and Answers* led to numerous requests from teachers, parents, students, and members of APH's Research and Development Committee for APH to adapt other editions of the same commercial series. APH received permission from Workman Publishing Company to adapt the following editions into braille and large type formats: *American History*, *Geography* [see separate report], and *English*.

Following the completion and availability of the adapted version of the *American History* edition, the project leader began working with an outside graphic designer to ready the *English* edition. Preparation of the text files received from Workman Publishing entailed separating questions and answers, correcting typographical errors, and proofing the files. The graphic designer then used these "clean" files to layout the large type portion, patterning the format after that defined for the *Science* and *American History* editions. Separate text files were also prepared for braille translation purposes by the graphic designer using initial-braille indicators to correspond with the visual icons. First drafts of the cover art and the text pages for both the large type portion and the braille portion were received in late March 2000. Once error-free, the files were given to the Braille Department for final translation tasks. Fortunately, the occurrence of run-over lines did not prove problematic for the *English* edition as it did for the adapted *American History* edition, allowing the production of 8.5" x 11" pages.

Unlike the *Science* and *American History* games, which are currently available from APH in both a large type-only format and a combined braille/large type format, the English game will only be available in the combined format. Based upon the sales of the *Science* edition, the Product Accessibility Committee recommended the development of only the combined edition of the *English* and *Geography* games. The Research and Development Committee supported this change and approved the purchase of the product with quota funds.

Work during FY 2001. The large type/braille edition of the *Brain Quest: English* was produced and made available in March 2001. Post-production activities included preparing promotional material, checking sales reports, and monitoring customer requests to determine the need for additional *Brain Quest* editions and other adapted commercially-available games.

Work planned for FY 2002. The product is completed and available for purchase.

Adaptation of Brain Quest®: Geography (Completed)

Purpose: To provide form blind and low vision students materials that will test and expand their knowledge of Geography through the use of accessible versions of a popular commercial product that will also encourage shared, fun experiences with sighted peers

Project staff: Karen J. Poppe, Project Leader
Kristopher A. Scott, Project Assistant
Monica Coffey, Project Assistant

Background. The debut of the braille and large type editions of *Brain Quest®: Science 1000 Questions and Answers* led to numerous requests from teachers, parents, students, and members of APH's Research and Development Committee to continue to adapt other editions of the same commercial series. APH received permission from Workman Publishing Company to adapt the following editions into braille and large type formats: *American History*, *English* [see separate report], and *Geography*.

Midway through the product development of the large type/braille version of *Brain Quest: English*, the project staff initiated work on the adaptation of the last of the four *Brain Quest* editions planned for production. Using electronic files of the *Geography* edition provided by Workman Publishing, an outside graphic designer began preparing "clean files" for large type and braille translation. The project staff participated in necessary proofing/editing tasks, shifting re-keying and initial text placement chores to the graphic designer, whose assistance allowed the project staff more time to concentrate on higher priority research and development projects. The first draft copies of the adapted version were received from the graphic designer in August 2000.

Unlike the *Science* and *American History* games, which were produced by APH in both a large type-only format and a combined braille/large type format, the *Geography* and *English* [see separate report] games will be available only in the combined format. Based upon the sales of the *Science* editions, the Product Accessibility Committee recommended the development of only a large type/braille edition of the *English* and *Geography* games. The Research and Development Committee supported this change and approved the purchase of the product with quota funds.

Work during FY 2001. The project staff continued to proof numerous drafts of the large type and "clean file" versions of *Brain Quest: Geography* until error-free. In March 2001, the product specifications were finalized and braille transcription tasks were initiated. Due to the occurrence of five pages with run-over lines in the braille version, the project leader sought Workman Publishing Company's permission to condense the text on these pages in order to achieve the preferable, more manageable book size of 8.5 x 11 inches; permission was received to minimally alter the text on these pages.

Although the tooling of Deck One of the *Geography* edition was finalized on schedule in May 2001, the electronic version of Deck Two experienced electronic problems that necessitated

complete rebuilding of the deck's large type version by the outside graphic designer. The project staff re-edited prepared drafts of this version during July 2001 and worked with the Braille Department to keep this project on the originally planned schedule. By the end of August, tooling was complete on both the internal text pages and the outside cover art. The pilot and initial production runs were completed by the end of the fiscal year.

Work planned for FY 2002. This project is considered complete. Post-production activities will include preparing promotional material and monitoring customer requests for additional *Brain Quest* packages.

Score Card Expansion (continuing)

Purpose: To expand APH's current Score Card design to accommodate a wide array of educational activities

Project staff: Karen Poppe, Project Leader
Tom Poppe, Pattern and Model Maker

Background. APH's current Score Card Set was conceptualized and developed by project staff in FY 1998 to accompany adapted versions of *Brain Quest*® recreational and educational games. Students involved in the field test of the braille/large print versions of *Brain Quest: Science* requested that the package include something tangible (e.g., dice or movable tokens) to make it seem more "game-like;" the development and inclusion of the Score Card Set addressed this request. Originally, the Score Card Set was designed to record or keep track of the total number of right answers given by each player. But since its initial introduction, the Score Card Set has proved useful for other purposes, including teaching beginning braille readers about the configuration of a braille cell, math applications, patterning activities, etc. The Score Card's tactile and auditory features, novel design, durability, and "fun" appeal for both students and adults, have contributed to its success.

In response to numerous requests, the project leader created two alternate models of the Score Card each with more "pop" buttons on a given card. The first design featured a 10 x 10 array of snap buttons with rows and columns labeled in a Battleship® game layout. A second design was a 10 x 8 snap-button grid with an open "window" above each snap button and formatted to the size of a standard braille sheet (11.5" x 11") that accommodated such activities as self-created braille/large print word hunt puzzles.

The project leader presented the "Expanded Score Card" idea to the Product Review Committee in October 2000 and received support to proceed with development.
In July 2000, the project staff conducted a preliminary investigation of a hydroforming process (by an outside vendor) to achieve a similar snap-button design, with a secondary goal of becoming more knowledgeable about the possibilities that hydroforming holds for producing perfectly registered thermoformed and printed images. Samples produced by the outside vendor were received in August.

Work during FY 2001. The Expanded Score Card project remained on the Goal 0 time line throughout FY2001 due to the project staff's involvement with higher-priority projects. However, an enhanced prototype was displayed at the Interim Meeting for review by the Research and Advisory Committee in April 2001. The prototype was also shown to a teacher from St. Lucy's School for the Blind as a possible device for creating bar graphs.

Work planned for FY 2002. The project will transition from the Goal 0 list to the active timeline and prototypes will be produced for field test purposes.

Low Vision

ENVISION I: Vision Enhancement Materials Distance Viewing Kit (continuing)

Purpose: To provide devices and materials for training students to develop skills in using optical aids for distance viewing after the student has had a low vision examination. These materials are designed for the "interim" time, that is, the time between the point at which the aids are recommended by the optometrist or ophthalmologist for the child, and the time he/she actually receives them

Project staff: J. Elaine Kitchel, Project Leader
Carol Hotta, Project Consultant/writer
Kristopher A. Scott, Project Assistant and Writer
Bernadette Mudd, Graphics
Scott Blome, Graphics
Paul Bither, O.D., Project Consultant

Working during FY 2001. Lessons received from the writer/consultant were revised and enrichment activities were added. Several revisions of the materials then were done in order to promote clarity and ease of reading. The materials, though somewhat technical, need to be easily readable and understandable by the teacher, the paraprofessional, and sometimes the parent. Sections of the materials are to be read by the student, so grade level of the reading material was edited for consistency. As work continued, the need to make separate curricula for older and younger children became apparent. Therefore division of the text occurred and separate enrichment activities for each level were written.

A carrying case for the monoculars was designed and prototypes were created by Tom Poppe. The foam inserts for the case underwent some revisions. The materials tote was selected as was art work to be screen printed onto both the tote and the carrying cases of the optical devices. Logos, cartoons, character drawings, and other graphics were drawn and revised according to need. Materials to make the student activity book re-usable were explored. Associated materials were developed. A field survey instrument was then prepared and prototypes were sent out for field testing.

Field testing provided data to support the need for the kit, the appropriateness of the content and practices involved, and the selection of devices and accompanying materials. Field testing also provided suggestions for revisions, inclusions, and deletions from the materials. Expert review by optometrists and other vision professionals provided additional suggestions and revisions. Inquiries were made to each State Board of Optometry regarding appropriate use of the ENVISION kits.

Selection of papers, plastics, foam, pigments, bindings, and other attributes of the kit materials will soon be finalized. Costs of the kits and their components will be determined.

Work planned for FY 2002. The project development team has determined a tentative list for the components of the kit. These components and their physical make up will be

specified for final production. Product documentation and tooling will be completed. The product will be scheduled to be produced in the third quarter of FY 2002.

ENVISION II: Vision Enhancement Materials Near Viewing Kit (continuing)

Purpose: To provide devices and materials for training students to develop skills in using optical aids for near viewing after receiving a low vision examination. These materials are designed for the "interim" time, that is, the time between the point at which the aids are recommended for the child by an optometrist or ophthalmologist , and the time he/she actually receives them

Project staff: J. Elaine Kitchel, Project Director
Kristopher A. Scott, Project Assistant/Writer
Bernadette Mudd, Graphics
Scott Blome, Graphics
Paul Bither, O.D., Consultant

Background. The research assistant and project leader met with the Communications Department to plan the large number of graphics which accompany this project. Graphics for accompanying activities were drafted and revised. Colors were selected, and the graphics were developed for use in prototypes.

As with ENVISION I, the need to split the curriculum in to two parts, one each for older and younger children, became apparent. The text was divided and enrichment activities were written and revised for each audience. Several revisions of the lessons, activities, and stories took place. Text sizes for the stories were selected, as were final selection of the graphics.

A carrying case for the magnifiers was designed and prototypes were created by Tom Poppe. The foam inserts for the case underwent some revisions. The materials tote was selected as was art work to be screen printed onto both the tote and the carrying cases of the optical devices. Prototypes were prepared.

Work during FY 2001. A survey instrument for field testing was prepared and field testing conducted. Field testing provided data to support the need for the kit, the appropriateness of the content, the appropriateness of the practices involved, and the selection of devices and accompanying materials. Field testing also provided some needed information concerning suggested revisions, inclusions, and deletions from the materials. Expert review by optometrists and other vision professionals provided additional suggestions and revisions. Inquiries were made to each State Board of Optometry regarding appropriate use of the ENVISION kits. Revisions continue as suggestions arrive from expert reviewers. Selection of papers, plastics, foam, pigments, bindings, and other attributes of the kit materials will soon be finalized. Costs of the kits and their components will be determined.

Work planned for FY 2002. The project development team has determined a tentative list for the components of the kit. These components and their physical make up will be specified for final production. Product documentation and tooling will be completed, revisions will be completed. The product will be scheduled to be produced in the third quarter of FY2002.

Individualized Systematic Assessment of Visual Efficiency: HTML files on CD (ISAVE) (completed)

Purpose: To develop an assessment instrument useful in evaluating the potential for visual efficiency of young children, including children with multiple disabilities in addition to visual impairment

Project staff: Elaine Kitchel, Project Leader
M. Beth Langley, Project Author/Consultant
Larry Skutchan, Technical Development

Background. During the development phase of ISAVE the product was presented to the Product Accessibility Committee for a decision about accessibility issues. At that time it was determined that the product would be released in regular print, cassette and on CD. In this way all accessibility needs could be addressed.

Work during FY 2001. After final production of the ISAVE kit was completed, ISAVE was translated into HTML and XML code for use as a Compact Disk to achieve complete accessibility (FY2000). After they were checked for accuracy and compatibility with various translation and output devices such as Duxbury and the braille embossing systems was conducted. This activity was completed and the document as coded worked best with Internet Explorer and Duxbury, but was also functional with Netscape and Word. The CD was burned, duplicated and put into the ISAVE as a component.

Work planned for FY 2001. The Project is complete.

ISAVE Video - "Good Lookin': ISAVE and the Minimally Responsive Child" (new and completed)

Purpose: To provide professionals in the field of vision a close look at the methods and tools used to perform functional vision evaluations on children who are minimally responsive. To provide examples of actual functional vision evaluation performed on real children in real time using *Individualized Systematic Assessment of Visual Efficiency (ISAVE.)*

Project staff: J. Elaine Kitchel, Project Leader
Suze Staugas, Occupational Therapist and Consultant
M. Beth Langley, Author of ISAVE
Kristopher A. Scott, Project Assistant
Aaron Frisbee, Technical Consultant

Background. Teachers have voiced their strong desire for a training tool that would teach them to read and understand the responses of children who are minimally responsive to visual stimuli. To fill this need expressed by those who conduct assessments of visual functioning, APH has undertaken the creation of a video that will focus on this aspect of the assessment of visual functioning.

Work during FY 2001. Editing of the raw footage, music, graphics boards, colors and content continued. Prototype tapes were made and a field test survey instrument was developed and sent out to field test sites across the country. Responses were very favorable. Editing continued based upon information gathered from field testing. A final version was compiled, duplicated and reviewed for quality. The product passed quality control and is now available for purchase.

Work planned for FY 2002. The product is complete.

Large Print Atlas Focus Group (new)

Purpose: To develop guidelines for the creation, formatting and appearance of Large Print Maps

Project staff: J. Elaine Kitchel, Project Leader
Susan Adams, Project Consultant
Meg Ginther, Project Consultant
Edward Hillyard, Project Consultant
Lane Koniak, Project Consultant
Kathy Krause, Project Consultant
Ike Presley, Project Consultant
Jean Reid, Project Consultant
Judy Strauss-Schwartz, Project Consultant
Kim Waegle, Project Consultant

Background. The American Printing House for the Blind received a strong recommendation from the Publications Committee in 2001 and in previous years to produce a world atlas in large print. Previous attempts to create such an atlas met with poor results. It was decided to convene a focus group made up of people who had expertise in both low vision and geography, as well as people with experience in literacy issues and student use issues in order to develop the guidelines.

Work during FY 2001. Vice President in charge of Public Affairs, Gary Mudd, and his assistant, Nancy Lacewell, met twice with officers of National Geographic in Washington, D.C. They opened a dialogue between APH and National Geographic for the purpose of exploring the potential for a joint effort in producing a large print atlas. They also met with Drs. Dave Howarth, Clara Leuthart, and Bob Forbes of the Center for Geographic Informational Systems at the University of Louisville, to see the latest technology and information systems which lend themselves to the creation of maps of infinite types.

The project leader then invited selected individuals from across the country to participate in the focus group. The focus group participants were given a presentation by Bob Forbes about the Geographic Informational systems and the capabilities thereof. With information about the latest technology, guidelines for the production of large print documents, and facts about color and contrast, the focus group took on the task of drafting guidelines for a large print, student atlas. Over a period of three days, the focus group efficiently and eloquently developed a set of guidelines which was so specific it could easily be applied to any set of maps. Only 5 questions remained unanswered and they will be answered later, when other guidelines are implement enough to see how further guidelines need to be shaped.

Work planned for FY 2002. A listserve or bulletin board will be set up for the purpose of communication among the various focus group members and the project leader. Further guidelines will be established when there is sufficient information to develop them. The project

leader will begin the task of changing existing digital maps according to the guidelines. The new guidelines will be shared with National Geographic to see if they are interested in producing a student atlas that would incorporate them.

Loving Me: A Guidebook for Creating and Presenting Workshops on Self-Esteem (new)

Purpose: To develop a curriculum that will enable facilitators to organize and run workshops that will address self-esteem issues encountered by adults and transition age youth who are blind or visually impaired

Project staff: J. Elaine Kitchel, Project Leader
Billy Brookshire, Author/Consultant
Tristan Pierce, Formatting
William W. Armstrong, Project Assistant
Bernadette Mudd, Graphics

Background. Self-esteem is a judgment people make about their self worth. The importance of this self-judgment cannot be underestimated; for this judgment determines how successful people are in school, work, day-to-day activities, relationships, and in almost all aspects of their lives. If people value themselves and their contributions, they are said to have high self-esteem. Loving Me is designed for those who seek to help people who are blind and visually impaired, their families, and the professionals who work with them to explore the origins and expression of their self-esteem through workshops.

Work during FY 2001. Data from field testing were analyzed and revealed a need for the product, a sound basis of content and high quotient of usefulness. The product was then revised according to feedback from field testing and formatted according to publishing standards. Artwork was added and the materials were typeset. This product received approval for quota sales.

Work planned for FY 2002. HTML coding will be completed and the product will then be printed, collated, and made available in both CD and large print. This is scheduled for the third quarter of 2002.

MasterPlan Calendar (series)

Purpose: To provide a systematic and organized way for students and adults with low vision to keep track of appointments, dates, bills, holidays, and other daily, weekly, or monthly events

Project staff: J. Elaine Kitchel, Project Leader
Marcia Gevers, Project Designer/Consultant
Loretta Curry, Desktop Publishing/Consultant

Background. While working as a rehabilitation teacher, Marcia Gevers become aware of the need for her clients to have a way to organize their bills and monthly reminders and to annotate their appointments. Ms. Gevers conceived of and designed the MasterPlan Calendar to fill that need. Each page enumerates and holds space for four days of the month, with enough room to write notes and appointment times. The month-at-a-glance pages are accompanied by a colorful pocket folder which can hold invoices and receipts for each month. Additionally a tab page for each month details in large print, the holidays and special events for the month.

Work during FY 2001. The project leader met with staff from the communications department to obtain cover images and artwork. Then a meeting with the typesetter was arranged and the calendar was typeset. The files were then turned over to a graphic designer for merging and formatting. The project leader met with departments of planning, large print, cost, engineering, purchasing and technical research to make sure all materials were ready and ordered and all systems "go" for the MasterPlan production. Changes in the 2002 version were also outlined.

Work planned for FY 2002. The calendar was revised slightly and the process was changed in order to make preparation and production easier in subsequent years. The 2003 Calendar should be easy to prepare for production and production should be underway sooner in 2002.

MasterPlan Medical Record Keeper (new)

Purpose: To develop an organizational tool for adults who have low vision that will provide a system for storing and easy access to personal medical information

Project staff: J. Elaine Kitchel, Project Director
William W. Armstrong, Project Assistant
Bernadette Mudd, Graphics

Background. This product is a new addition to the MasterPlan series of low vision organizational tools. Reaction to the initial MasterPlan products was very favorable from both consumers and professionals. The medical record keeper was suggested by both professionals and consumers.

Work during FY 2001. A prototype of the product was finalized and field tested. Results were unanimously favorable. Most respondents indicated that type larger than 18 point was needed to be legible by the largest number of adults with visual impairments, and more categories were needed. Adjustments were made to the product format.

Work planned for FY 2002. The production team will meet to discuss the issues involved in producing the MasterPlan Medical Record Keeper. Suggestions will be implemented and the project will be completed in the second quarter of 2002.

Protocols for the Observation and Recording of Visual Behaviors (new)

Purpose: To provide the mainstream teacher with referral information, resources and guidelines for tracking the educational planning, personal progress, social adjustment, mobility needs, transition needs, and possible changes in the vision of his/her student with visual impairment

Project staff: J. Elaine Kitchel, Project Leader
Marcia Gevers, Project Consultant
Robert Murphy, Project Consultant
Richard Windsor, O.D., Project Consultant
Michele Dechman, Project Consultant
William A. Armstrong, Project Assistant

Background. The scarcity of information for mainstream teachers who are working to fill the needs of a student with a visual impairment dictated this project. In addition to meeting the educational, transitional, and social needs of the student, the teacher needs to understand his/her role as part of the student's overall vision care team. Provisions for illuminating the teacher with information about low vision and how to record visual behaviors which may indicate a change in the student's vision, demonstrating appropriateness of referral are highlighted.

Work during FY 2001. Work on this project began in 2000, when the first several drafts of each chapter were written and underwent a preliminary edit. In 2001 the chapters were re-organized, re-written, re-edited and sent out for field testing along with their accompanying consumable materials. Field reviews of the prototypes were overwhelmingly positive, re-establishing the need for the product as well as its usefulness, informative qualities, organization, and helpfulness as a guide and resource. Revisions of the text and the accompanying materials based upon results from field testing have begun.

Work planned for FY 2002. Completion of revisions of the product are expected. The production team will meet to determine the best way of
producing this product and decisions based upon those meetings will be made. The product is due to be completed in the third quarter of FY2002.

Rigid Testing Board (new)

Purpose: To provide persons who use the ISAVE materials a transparent board for the testing of visual fields and certain general acuities

Project staff: J. Elaine Kitchel, Project Leader
Tom Poppe, Product Designer

Background. After the development and release of the ISAVE materials it became apparent that a rigid, transparent board would be needed to perform the assessment activities in the Visual Fields and Acuities chapters. Therefore APH would create a product to be used by teachers and practitioners for that purpose.

Work during FY 2001. Product idea was developed. Timeline was developed. Initial trial of various materials and designs are underway.

Work planned for 2002. Develop prototype, perform field testing, develop final product based upon field reviews.

Smaller Books Larger Print (new)

Purpose: To determine characteristics of large print books which would make them more accessible, manageable and appealing for the end user and to set standards for APH's large print products produced in text and electronic format

Project staff: J. Elaine Kitchel, Project Director
Frank Hayden, Project Assistant
Chip Dumstorf, Font Development

Background. The Smaller Books Larger Print Project under the leadership of the Large Print Task Force of 1999 and 2000, was responsible for items 1 and 3 of the directive given by the Publications Committee in May of 1998. At that time the directives were:

- Conduct research on issues surrounding large print for usability and educational validity.
- Pursue electronic book options.
- Resolve issues and set standards in clarity and contrast of text and images, point size, font characteristics, leading and density.

In the year 2000 the recommendation of the Joint Committee was expanded to include:

- Provide large print textbooks in a point size based on research and input from the field.

And in 2001:

- Uniformly adopt standards such as 18 point type and APHont that have proven product efficacy.

Work during FY 2001. The second and fourth recommendations were picked up by the ATIC project when it was instituted. However, the remaining recommendations were largely completed by the end of FY2001. The low vision project leader, researched all publications in English for the past 30 years which had relevance upon standards and guidelines for the development of standards regarding large print documents, and the typographical characteristics, readability and usability of those documents. The project leader also worked with the Publications Director of the Federal Health Care Financing Administration and arrived at standards for characteristics of paper including weight, color, and gloss factor. Guidelines were also developed for book size, weight, page and paragraph formatting, font characteristics, font size, leading, spacing and other features of typography. These guidelines and the research which backs them were developed into documents which were then made public via the APH website.

Work continued with the American Foundation for the Blind who adopted standards for print readability that are mutually compatible with those of APH. The project leader then worked

with the font developer to develop a font which embraced all the identified characteristics of large print which are known, through research, to promote readability for persons who use large print. A final version of the basic font was adopted in June 2001 and the font was released free to all who wish to use it. In addition, the project leader met with the Product Advisory Team, presented a position paper and made a recommendation for standards of large print books, to be formally adopted by APH.

Work planned for FY 2001. A suite of fonts from the basic APHont will be developed. The bold and italic faces of the font as well as diacritical marks and Mac versions are needed by APH and others for the production of large print documents. The Guidelines for the Production of Large Print Documents for Optimum Readability will continue to undergo revision as research and progress dictate.

Termite Torpedo (continuing)

Purpose: To give low vision students practice in the visual skills of locating, fixating, tracking, aligning, and following.

Project staff: Elaine Kitchel, Project Leader
Larry Skutchan, Advisor
Rodger Smith, Programmer
Jonathon Creasy, Programmer
Rob Meredith, Project Assistant
Sarah Ballard, Project Assistant

Background. Since computer games were invented, students with low vision and their teachers have been requesting computer games that are both helpful and fun. In response to this need for computer games, APH staff set a high priority for development of software that helps develop visual skills and eye-hand coordination. This software will be designed to help the child with low vision increase his or her skills in tracking, aligning, following, and establishing visual closure.

The project leader developed the concept and specifications for the Termite Torpedo game. These included large, high contrast graphic elements with the ability to reverse the screen colors and several levels of play that increase the complexity as the level number increases.

Project Assistant Sarah Ballard created some "place holder" graphics that helped the programmers begin prototyping.

The programming team examined the specifications and determined the language and technology used for the project. They chose to write the code in Javascript with gif formatted graphic objects.

Work during FY 2000. Programmer Rob Meredith composed, edited, and finalized musical sequences for varies parts of the game. He also composed a musical background for use during game play. He created several sound effects.

Consultant artists created graphic elements for the game including colored bombs and blobs that are used as part of the game strategy.

Programmers Rodger Smith and Jonathon Creasy wrote a skeleton project and began adding functionality as needed. They wrote routines to animate and move the images, determine proximity to an object, determine adjacent elements on the field, and move the aardvark. They also wrote functions for gathering information about the user and that user's preferences.

Smith implemented a 1- or 2-player game choice and implemented radio buttons in the opening screen that allow the player to choose sounds, beeps or no sounds.

He implemented a way to recognize automatic advancement to the next level for the 2-player game.

He created functions that verify the next level has been reached or the end of the game has occurred.

Smith resized the game, allowing it to be played using high resolution and contrast.

He implemented functions that populate the screen with termites; termite density is based on the level of play.

He created functions that move the aardvark across the screen and drop a torpedo in synchronization with the aardvark.

He wrote functions that allow the arrow keys to move torpedoes horizontally and vertically.

He created functions that delete vertical or horizontally termites / torpedoes / blobs when struck by falling torpedoes based on the level and number of termites / torpedoes / blobs in alignment. He created functions to keep track of the player number and score for both one and two player games.

Smith created functions and screens that are used to determine level advancement and the end of the game and display numeric level advancement screens or the end screen.

He created functions that imitate the appearance of rainfall and which clear the top most image in the field.

He created functions that delete an entire column when a rainbow torpedo falls in a given column.

Smith incorporated the digital audio component into the program to play and queue sounds.

He wrote functions that, at the user's choice, announce the surrounding items as the torpedo drops. This makes the game playable by a totally blind student.

Larry Skutchan wrote draft documentation.

Work planned for FY 2002. Once the initial coding is finalized, in-house testing of the game will be conducted. A beta-test version of the game will be distributed to field test sites. Revisions based upon field test results will be made, final specifications will be developed, and the game will be produced on CD.

Visual Accommodation Requirements of Students with Low Vision (continuing)

Purpose: To conduct basic research to determine visual accommodation needs, requirements, and strategies of students with low vision

Project staff: J. Elaine Kitchel, APH Project Leader
Amanda Hall Lueck, Project Consultant

Background. This was the second in a three-year study on how magnification, accommodation, and the visual reserve affect reading efficiency in students who already know how to read.

Work during FY 2001. Testing of the control group was completed in March 2000. Due to unforeseen circumstances the timeline for this research was extended. Tabulation and evaluation of the scores of the subjects took place in the spring of 2001. Results underscored and added to the findings of 1998 which revealed that students read more efficiently at print size 1.6 times larger than the smallest print they can read. This numerical difference is called the "reserve." The study also compared reading efficiency scores of subjects reading short passages of text using large print and/or magnifiers. The study measured accommodation skills using magnification at varied distances and then rendered scores.

Work planned in FY 2002. During the first quarter of FY2002 work will begin on a study to determine reading efficiency scores in students who read continuous passages of text using optical devices, large print and combinations. These tests will be conducted on subjects who already know how to read.

Mathematics

Abacus Basic Competency (continuing)

Purpose: To produce instructional materials that teach use of the Cranmer Abacus by a simple counting method

Project staff: Eleanor Pester, Project Leader
Carol Roderick, Project Assistant
Kristopher A. Scott, Project Assistant

Background. In July 1997, Susan Millaway submitted a book she had authored to APH's Product Review Committee for production consideration. The book, Abacus Basic Competency, teaches use of the Cranmer Abacus by a simple counting method. It was reviewed by three APH staff members who have abacus experience. A report regarding the in-house reviews was made to APH's Product Review Committee members, who suggested that some consultants in the field review the book. Braille and print copies were prepared and sent to teachers in Kentucky, Pennsylvania, and Michigan for review. The decision was unanimous that the book be published. An oral agreement concerning publication of the book was reached, and later a contract was signed.

Production specifications were finalized. The book was tooled for print production, proofed, and edited.

Work during FY 2001. Braille transcription was completed. Print corrections were completed. Copy was proofed.

Work planned for FY 2002. Production and availability for sale are currently scheduled to be completed by the end of this calendar year.

Digital Clock Model (formerly included in Elementary Math Aids) (continuing)

Purpose: To develop a digital clock model to help students with visual impairment in understanding the working of digital aids and in interpreting time shown in digital format

Project staff: Eleanor Pester, Project Leader
Carol Roderick, Project Assistant

Background. The Digital Clock Model is one of eight standalone math aids recommended by a math focus group for development in a meeting in 1994. This focus group discussed the needs of young braille users in elementary math and the results of a survey of teachers from the elementary and itinerant divisions of the Association of Education and Rehabilitation of the Blind and Visually Impaired (AER) on needs in the area of math, set priorities for the materials to be developed, and determined specifications for the materials. In 1995 a prototype digital clock model was developed and prepared for field testing. In 1996, the digital clock model was field tested, results were analyzed, and specifications for the production model were prepared based on the results of the field testing. In 1997 outside venders submitted bids for production of the clock. In 1998 the Digital Clock Model was put on hold because of the high cost of tooling. In 1999 efforts to produce the clock at a reasonable price were explored. In 2000, APH staff began working with a vendor on the tooling necessary for the production of the Digital Clock Model. Although several samples were produced, none proved to be satisfactory.

Work during FY 2001. The quest for a satisfactory production Digital Clock Model continued, and in the 4th quarter looked promising enough to send the latest models, along with an information sheet, out to ten teachers for review. Data was analyzed and necessary revisions were reported to the manufacturer.

Work planned for FY 2002. Necessary revisions will be made to the production Digital Clock Model, and the information sheet will be prepared for inclusion with it. Work on this project should be completed this year.

Magnet Mate Math (new)

Purpose: To enable sighted teachers who do not know braille to convey mathematical formats and expressions to students who are blind

Project staff: Tristan Pierce, Project Leader
Tom Poppe, Pattern and Model Maker

Background. Fred Gissoni, APH Customer Support Specialist, saw Rebecca Worrell, a math teacher in South Carolina, give a presentation on the Magnet Mate Math. He presented the metal board with magnetic braille/print symbols to the PRC in June 2000. It was approved with the stipulation that preliminary field-testing be done to determine the product's usefulness.

Work during FY 2001. Rebecca Worrell created six prototypes for preliminary field-testing. One math board arrived damaged. Four math boards were sent out for testing and the final board was kept at APH. The math boards were tested at two residential schools and reviewed by two itinerant teachers. All reviewers agreed the product had educational value, especially for those students who have a difficult time grasping math concepts. They recommended that the product be made more accessible for students who are blind to use independently. The opportunity for peer interaction that the math board could provide was of particular importance to reviewers also. The Product Development Committee will meet before the end of FY 2001 to set a time line.

Work planned for FY 2002. The final design of the product, based in part on preliminary field-testing will be completed. Projected availability is 2.5 years.

Primary Math Units (continuing)

Purpose: To develop instructional math materials for use with blind or visually impaired students in the primary grades as either a supplement to the classroom math program or as a core curriculum

Project staff: Eleanor Pester, Project Leader
Carol Roderick, Project Assistant

Background. Math achievement of blind students has consistently been behind that of their sighted peers. In recent years, very little research and product development have been done to improve this situation. Teachers of students who are blind, however, have continuously requested special braille curricular materials for math similar to those in the Patterns programs developed at APH to teach braille reading. Because of the dramatic increases in the number of blind students mainstreamed and use of the itinerant special education teacher model, the math priority stated in GOALS 2000, and new teaching standards adopted by the National Council of Teachers of Mathematics, it became critical to focus once again on math materials for visually impaired students. This project received special funding as part of a three-year research initiative to develop new products in math, science, and geography. (For additional information, see the write-up on Elementary Math Aids.)

During the Mathematics Focus Group Meeting in September 1994, this program was discussed and specifications were determined. Other work on the project included a review of the research and literature on math instruction for visually impaired students; analyses of math curriculum guides; thorough analyses of current textbooks to determine mathematical symbols, terms, and concepts being taught; a search of the catalogs for commercially available math related products; and a review of programs on abacus instruction.

By 1996, prototypes of eight Primary Math Units and a general guidebook began to take shape with guidance from Dr. William E. Leibfritz, math consultant. In July 1996, a group of teachers of the visually impaired met at APH to share ideas they found to be particularly effective for developing math concepts and practice materials for their visually impaired students in the primary grades. These ideas were incorporated into the strategies for the math program. Because work on the Primary Math Units proved to be more extensive than originally thought, work continued on the materials and field testing was postponed. In July 1997, project consultants, Dr. Leibfritz and Susan Millaway, met at APH and reviewed in detail the teaching strategies for the kindergarten and first grade Primary Math Units. The Project Leader developed an introductory book that presented the philosophy and overview of the program, and provided information on such specialized topics as adapting materials, using the Cranmer Abacus, and writing the mathematical braille code.

Appropriate worksheets were developed by Betty Modaressi to supplement the Primary Math Units. Lessons for Unit 1: Matching, Sorting, and Patterning for kindergarten through third

grade were checked against the original concepts to be taught, and a few lessons were rewritten to better meet the needs of students who are visually impaired and to better present the concepts

being taught. Worksheets for this unit were checked for coordination with the lessons. The number of worksheets was expanded to better cover the concepts presented in the lessons.

Plans were made to begin field testing the Introductory Book and Unit 1 Lessons and Worksheets with visually impaired children in kindergarten through third grade. Tooling of prototype materials for field testing Unit 1 in both braille and print was begun.

Work during FY 2001. Evaluation forms for the materials in the introduction and Unit 1: Matching, Sorting, and Patterning were drafted. Tooling of prototype materials continued with coordination of print and braille worksheets requiring much more time than originally planned. Efforts have been made to find a consultant to help with preparation for field testing of Unit 2: Number Concepts, Unit 3: Place Value, and Unit 4: Number Operations for all four grades.

Work planned for FY 2002. Evaluation forms for the Introductory Book and for Unit 1 Lessons and Worksheets will be finalized. Evaluation sites will be contacted. Production of the Unit I materials is currently scheduled to be completed by November so that field testing and analysis of data can be completed and preparation of Units 2, 3, and 4 can be focused on and print tooling begun.

Quick Pick Counting and Quick Pick Money (continuing)

Purpose: To explore the effectiveness of using sets of Quick Pick Counting and Quick Pick Money with blind and visually impaired students

Project staff: Eleanor Pester, Project Leader
William W. Armstrong, Project Assistant
Carol Roderick, Project Assistant

Background. As part of the Elementary Math Aids project, APH produced braille/print versions of Quick Pick Addition, Quick Pick Subtraction, Quick Pick Multiplication, and Quick Pick Division.

Another promising set of Quick Pick materials, Quick Pick Counting, can be used to introduce counting with tactile illustrations. This is an important step which should directly follow exercises in which students count real, concrete objects. For the tactual learner, however, this step is often omitted. Since illustrations used in textbooks can be very difficult to interpret tactually, the early levels of the textbooks are often not produced in tactile format at all.

Another promising set of Quick Pick materials, Quick Pick Money, can be used for coin identification and counting. Inexpensive, self-checking, accessible materials that provide such practice are not readily available, though they should be since identifying and handling money are important life skills.

During FY 2000, preparations were made for field testing Quick Pick Counting. Prototype copies of Quick Pick Counting for evaluation was developed. Production of copies for field-testing was begun. An evaluation form was drafted.

Work during FY 2001. Evaluation forms and procedures were finalized. Because of unanticipated delays caused by production problems, prototype copies for field testing were not ready until school was out for the summer. Field testing began at NFB Kids Camp and KSB Summer School. Additional field testing is scheduled for the fall.

Work planned for FY 2002. Field testing of Quick Pick Counting will be completed, the results analyzed, and preparation made for production. Work on Quick Pick Money will begin with the development of a prototype for field testing. Subjects for Quick Pick Money included typical school-age students, as well as adventitiously blinded adults.

Microcomputer Applications and Products

APH Digital Audio Component (continuing)

Purpose: To create digital audio recording, playback, and navigation components for use in several educational, application, and utility programs under development

Project staff: Larry Skutchan, Project Leader
Rob Meredith, Programmer
Carol Stewart, Advisor
Steve Mullins, Advisor
John Zinninger, Advisor

Background. As a result of working closely with the Digital Audio Information System (DAISY) consortium and the National Library Service (NLS), and because APH requires quality audio production for the development of educational software and studio projects, the need for digital audio recording, playback, and navigation services that are robust and reliable was realized. After an analysis of APH's digital studio needs, which continues to include regularly scheduled meetings with several departments interested in digital audio technology, and APH's unique requirements during the transition from analog to digital recording and storage, the committee conducted an intense search for existing applications or components that fulfill the requirements set forth by the Digital Committee.

The most important requirement was that the development and application of new digital audio component not disrupt APH's audio production process. The studio must complete several hundred books per year, a demand that discourages any delay in production. Another important consideration regarding a new digital recording component was the requirement that it perform every action at least as efficiently as its analog counterpart. For example, a digital system that requires three minutes to perform an action that might be performed in fewer than 20 seconds with an analog system would be not be considered. Similarly, the digital recording system must allow the narrator to control the record, play, rewind, and edit functions from a location remote from the PC actually storing the recording. There must also exist a means for communication between the monitor who is outside the studio and the narrator who resides in the soundproof recording booth. The possibility of a separate interface to fulfill this need also exists. Another requirement involves the precision of the controls needed for editing and "punching in" at the exact point where, after a pause or the replacement of a section of the recording, the narrator must resume reading. The digital arena provides the means to ramp a recording to its full amplitude within a minimal amount of time. This process helps reduce sudden changes in background noises or inhalations and thus smoothes out the transition from the existing sound to the new sound.

In addition to the requirements they identified, the Digital Audio Committee realized that several other features could easily be incorporated into a component of this type once the base services were established. Such features are not necessities, but their addition should help streamline the audio production process. One such feature, the ability to generate tones used for indexing on cassette tapes, brought about a host of unique capabilities that, while limited in terms of length of

time in service due to National Library Service's gradual move toward digital recordings, proved invaluable during this odd time when NLS requires digital masters, yet still distributes the cassette medium to end users.

Another function of the digital audio software component is the ability to utilize the recording studio's existing control boxes. These boxes contain custom controls that provide the narrator with simple control and status information in a package that is familiar, efficient, and tactually pleasing.

After engineers provided the programmer with specifications of the control box, the programmers were able to directly interface the control box with a PC joystick and serial port and read its control status while providing the box with the current it needs to display its status lamps. The group also realized the relative simplicity of replacing the intercom system that allows the monitor and narrator to communicate with a system that utilizes a PC soundcard.

Other features that were incorporated because of the relative ease in which they could be created included the following:

- The ability to signal the narrator with a tone in his earphone when approaching the 88-minute time limit of a single side of a cassette.

- The ability to drop a specified audio queue into the narration. Several of the educational software projects in development, including Book Master, Talking Typer, Speaking Speller, and Teacher's Pet require a digital audio recording and playback component. In addition to its needs for playback and recording controls, the Book Master project required navigation controls and the ability to speed up the playback of the recording without affecting the pitch, as which happens with analog playback equipment.

Given the diverse requirements and the interesting possibilities offered with custom software, APH decided to develop its own digital audio record, playback, and navigation component for use with several projects underway and to develop an interface using that control to provide a studio recording application.

Programmers met with studio staff to refine and prioritize the requirements of a digital recording application for use in the studio. In March 2000, they delivered the first prototype of an application for testing. The programmers observed recording sessions, gathered feedback from engineers, narrators, and monitors, and introduced revisions. This studio recording program has become known as APH Studio Recorder. In addition to all the features discussed as possible with custom software, this application provides additional unique user interface features that meet APH's unique needs. These include an extremely large time display that provides the monitor or sound engineer exact times at a glance, resizable, three color peak meters that remember their size and position on the screen, one key punch in and out, and other component

features like the ability to quickly open a file, MP3 decoding and encoding, time scale modification, and phrase detection.

The component itself provides a duel interface through Microsoft's Component Object Model (COM) architecture so it is directly usable by a variety of traditional programming languages as well as newer scripting languages like Javascript, VBScript, and Windows Scripting Host. This makes it easy for each of the educational software packages under development, no matter the language of the application, and future projects to take advantage of the services the component provides. Book Master, APH Studio Recorder, Teacher's Pet, Speaking Speller, Talking Typer, and Termite Torpedo all use the digital audio component. The duel interface COM architecture also makes the component easy to distribute and for other software engineers to use if APH licenses its technology. There has been a great deal of interest in this area after the presentation of the time scale modification and phrase detection algorithms at the DAISY technical conference in March 2000.

Work during FY 2001. Having provided the basic components for traditional digital audio tasks for the recording studio and some of the educational software packages under development during the previous year, the programmers used this year to focus on aspects that directly affect the end user. Such features included the development of the time scale modification algorithms and the phrase detection algorithms. Sound insert and delete features for use more in the studio recorder were also created. The staff spent a significant amount of energy insuring the time scale modification algorithms did not infringe on any patents.

Larry Skutchan and Tony Grantz (Development) met with another company to discuss putting the TSM algorithms into their software for APH's use, and these discussions continue. Larry Skutchan, Rob Wise, Paul Zurkuhlin, and Bill Beavin met with patent attorneys to protect APH interests when licensing components to other companies.

The APH Digital Audio Component received the following enhancements:

- Support for basic marking. This includes commands to set and clear marks. The marks are implemented as compatible regions, so they are preserved when an audio file is edited with another program.

- Index tone generation and removal. This feature lets the narrator place the tone where it is supposed to end. Then the software reverses for seven seconds in the recording and starts the tone at that point. These indexes (indices?) are also treated as marks that can be exported and imported back into the studio recorder.

- Automatic crossfade function which is used when entering record mode. This smoothes out transitions between two recording sessions.
- Support for wave bins. These are groups of sound files that can be dropped into a recording at the touch of a key.
- Support for decoding and encoding MP3 files. Staff also attempted to resolve licensing issues with MP3 encoding processes.

- Phrase detection. This detection is based on the length of pause between phrases. The object divides these into three length categories and calls these sentence, paragraph, and section lengths.
- Support for saving the last used position in a file.
- File queuing functions.
- Time scale modification. This feature allows the user to speed up the playback of the recording without getting the unwanted pitch distortion characteristic of analog recordings.
- Windows 2000 compatibility.
- Revised component documentation.
- Finalized the interface for possible technical licensing customer.
- Editing support, including selection, insertion, and deletion. These functions work instantly, even with enormous files, and they work in conjunction with the component's "fast open" feature. The addition of this function puts these audio components into a world class category by delivering performance that is unsurpassed in any commercial products that perform similar functions.
- A sample application for use as a demonstration on incorporating the digital audio components into another application.

Rob Meredith added the following enhancements to the APH Studio Recorder:

- Support for selecting bin groups, and using bins.
- Multiple pages to the settings dialog.
- Keyboard interface to support phrase detection.
- Confirmation sounds when adding and removing index tones.
- The ability to insert index tones with the studio remote control.
- Windows 2000 compatibility.

Work planned for FY 2002. There are still several advanced features that require significant amounts of research to implement. Among these are the addition of noise floor detection, a band pass filter, pattern detection, and some advanced functionality in APH Studio Recorder that prepares all four sides of a cassette for the digital bin that is used to make the cassette copies of a tape. One expressed need is index tone detection from an external source. The component already recognizes the location of tones inserted into the audio material, but the ability to detect tones from an external source will provide the ability for Book Master to import a cassette tape master and convert the existing index tones into heading markers or page markers for the digital distribution of a talking book. Staff must study the implementation details of Windows Coder/Decoder (CODECS) drivers and deploy APH's time scale modification algorithms as a CODEC. This provides the opportunity to offer this technology to the end user and to make the technology available from within other commercial applications unfamiliar to TSM, but that support the use of CODECs. The programming group believes writing band pass filters as CODECS is the best option, especially since the code base becomes much more reusable when deployed in this manner.

A detailed analysis of the pause patterns of a particular narrator will also prove useful. Such a study will ultimately permit the phrase detection algorithms to make a more intelligent decision about what constitutes a sentence, paragraph, and section break in an audio work not specifically prepared for the DAISY format. It will also provide the user with the ability to navigate quickly and easily through raw, unprepared recordings, or to use the features for local navigation for the vast majority of DAISY books that will not be marked up to the sentence level. Such pattern detection also opens up other interesting possibilities. These include the ability to find an unusual sound, to identify and find a particular word or sound, and possibly the ability to replace one sound with another.

The programming group would like to enhance the new Time Scale Modification algorithms to take advantage of the new phrase detection algorithms in order to remove pauses between phrases when the user requests compressed speech. Some reports claim that listening material can contain 20% silence. The TSM also deserves significant attention in several respects including finding ways to make it more consistent among different narrators, getting it more intelligible at greater speeds, adding expansion capabilities, and researching differences between real human speech and processed speech at fast rates.

Yet another area of concentration for 2002 is streaming technology. The digital audio component should provide full streaming services to the client in a variety of environments. Server side implementations of the component should be capable of providing a local user navigation and time scale services, thereby reducing the amount of data that is transferred.

Staff will continue to refine the user interface. Plans include larger slide bars and some kind of visual sound representation. Staff will also write documentation for the studio recorder application.

Staff will obtain information regarding the use of an alternate remote control pad, perhaps one that is available commercially. Touch screen display and control, and developments in font technology, and display resolution and clarity are all areas the technology group monitors closely.

Staff will present the APH Studio Recorder to the Product Review Committee to determine whether this software could be offered as a commercial product. Benefits include all the features already mentioned for the recording studio, plus the fact that this is the only totally accessible professional sound recording and editing software package in existence.

APH Speech Environment (continuing)

Purpose: To develop a reusable foundation for current talking software from APH

Project staff: Larry Skutchan, Project Leader/Programmer
Rob Meredith, Programmer
Keith Creasy, Programmer
Mario Eiland, Programmer

Background. APH is developing new talking software that runs under current and future versions of Windows. While each completed title is different, they also have much in common, especially in respect to access issues. The APH Speech Environment (ASE) provides the following common services to all the programs under development:

- speech or braille output
- controls to select speech and braille parameters
- record and restore user access settings
- accessible output to standard Windows menus and controls through an interface to Microsoft's Active Accessibility (MSAA) components
- standard interface to speech controls and enhancements to standard text-to-speech (TTS) engine behavior targeted for use by blind and visually impaired users
- precise punctuation control and consistent rendering among various text-to-speech engines
- interactive TTS engine selection
- interruptability
- detection of demonstration versus registered program with an interface to accept and store registration information
- dictionary translation
- digitized audio playback control, including the ability to generate studio scripts of a program's prompts and an interface that uses those recordings for program interaction and control Interactive contracted braille

ASE is a program module that provides these core services. While it will not be a stand-alone product, it is included as part of most APH software developed for Windows and could be provided to other accessible software manufactures as an effort to meet the 508 regulations referring to government procurement of electronic tools.

During the first few years of APH software development, standard services were enough to meet the needs of the software under development. Providing access and speech to common Windows controls and menus, a means of controlling speech parameters and voice selections, a means of stopping the speech on request, a way of repeating the information, and precise punctuation pronunciation control were once enough to meet the needs of the applications under development at APH.

As more titles gain popularity, ASE's capabilities must expand to meet the needs of the new software. In APH's first three titles, for example, the software was all written in C or C++ programming languages, and none of the packages required the ability to echo keyboard input, albeit each provided this functionality. Neither did the titles have much need for braille output.

ASE's role has already expanded with the introduction of a user registration mechanism. These algorithms let the application query registration information and inform the application as to whether it is running as a demo or as a full version. They also provide a user interface that describes the limitation built into the demonstration version of the calling application and offers the user the ability to enter a registration key obtained either electronically of via phone from APH customer support. Customer support representatives use an application written by research programmers to generate a unique number derived from two pieces of information--the name of the program and the customer's name or email address. Once the customer enters that unique number, the application is converted from a demo into a fully registered version of that program.

Now, as APH experiments with development under different programming languages, and with the need to provide these technologies to other companies that wish to license APH's software, the flexibility of ASE's interface must be improved. The first version of ASE was packaged as a standard Windows Dynamic Link Library (DLL). This is an extremely efficient means of passing large amounts of information from one component to another. Unfortunately, this technique is feasible to use only with the C programming language. As ASE's capabilities expand and the demands on it from client software expands, ASE required moving to the Component Object Model architecture. About 80% of ASE's functions have been converted to this architecture, and several educational software products are already taking advantage of ASE's new interface and capabilities.

In addition to its first focus on speech access, ASE's progress in braille is equally important and essential in future endures. APH purchased the source code to a popular braille translation program that runs under DOS and began converting it to Windows and adding functionality.

Work During FY 2001. Programming staff modified the DOS source code of Easy Braille to run under Windows. An interface using the Component Object Model (COM) was written so that access to its services could be flexible. Thus, while the braille object can be part of ASE, it is also available as a stand alone component for those applications that do not need speech services or for those applications that might require more control of the translation process. The staff also wrote support algorithms that allow the translation object to take multiple translation tables and change translation tables on demand.

The staff also modified Easy Braille's translation tables. Created was a new reverse translation table that transforms contracted English braille into plain English text. This process is necessary for several projects including Book Master, where it will be used to coordinate precisely the cursor positions among multiple views of a book. The staff also enhanced the forward translation table, enabling it to properly translate email addresses and Web addresses.

Staff wrote a test application allowing the use of the braille translation object with an MFC application that contains two windows. The user types or pastes text into the first window, then moves to the second window to receive a contracted braille translation, which is displayed by use of the APH Braille font. To acquire a braille to text translation, the user need only reverse the simple steps above.

Programming staff wrapped a COM interface around ASE's functions and added several new methods and properties to the new interface.

Work planned for FY 2002. The Programming staff will enable the braille translation object to compile raw translation tables at run time. This modification will simplify the processes involved in enhancing existing tables and creating new translation tables for other languages and applications.

Functionality will be added to the translation object, permitting it to receive a number representing the caret position as one of the translation parameters or properties and return the caret position in the translated version of that text.

The staff will incorporate the new translation object into the Road Runner Down Link software, enabling customers who want to read braille files with synthesized speech to do so without any intervention on their part.

Programmers will incorporate ASE and the braille component into a new project called Money Talks. The braille component enables Money Talks to emboss in contracted braille hard copies of hard copies of check registers and other financial information.

Echo functionality will be added to ASE, and programmers will investigate the requirements involved in providing with digitized speech keyboard feedback. Moreover, speech feedback will be added to word by word cursor movement within edit controls.

The programmers will add speech support through ASE for two new controls--the Rich Edit control and the HTML document object model through the Internet Explorer Server control. Presently, the Book Master program uses these controls (see separate write-up). Additionally, speaking cursor algorithms will need to be developed.

APH Technology Update (series)

Purpose: To provide current information on educational software, technology access, and technology in education

Project staff: Larry Skutchan, Project Leader
Rob Meredith, Project Assistant
John Hedges, Project Assistant
Keith Creasy, Project Assistant
Bernie Mudd, Project Assistant
Kristopher Scott, Project Assistant
Rodger Smith, Project Assistant
Mario Eiland, Project Assistant

Background. Technology Update evolved from a handout provided to attendees at a 1985 Summer Training Session at APH. The Ninth Microcomputer Advisory Committee, along with professionals in the field, requested that the publication become a permanent newsletter providing ongoing information on access technology for those with visual impairments. Since its inception, the publication has evolved from a simple, printed handout to a publication available in large print, braille, cassette, IBM disk text files, and HTML on the APH Web site. The content of the publication includes articles covering such topics as new APH technology products, family focus, user tips, and exploration of new assistive technology. The copy for each issue is provided to the Communications Group in Advisory Services for desktop publishing and preparation in the various accessible media.

The newsletter continued to be provided as a free service to the visually impaired community and those who serve them. A Spring-Summer 2000 issue was prepared and distributed. It contained articles about how to take advantage of style sheets for accessibility, a continuation of a series on effective use of email programs like Outlook Express, introductions to Braille 'n Speak Scholar, Math Flash, Talking Typer, and Road Runner. The issue also contains a detailed article on obtaining electronic reading material with active links to appropriate places on the Web. The cassette and Web versions of the latest issue also contain recorded audio demonstrations of Road Runner, Math Flash, Talking Typer, and Braille 'n Speak Scholar that provides the audience a better idea of how the product sounds and acts.

Work during FY 2001. The programming staff began articles that update the electronic text sources article written for the Spring/Summer 2000 issue. Also included are complete details and recorded demonstrations of three new APH software products--Book Master Audio, Teacher's Pet, and Termite Torpedo. Download links for the three programs have been incorporated into the web edition. The staff are also developing articles providing a detailed look at DAISY, and an accessible, commercially available electronic game.

Work planned for FY 2002. The staff will author detailed articles concerning full-featured versions of Book Master, Speaking Speller, Word Play, and Money Talks. Programmers

will relay web accessibility tips that transcend the Section 508 regulations, as well as providing a technical look at producing a DAISY full-featured book.

Book Master (continuing)

Purpose: To provide a program that enables a student to read textbooks using the National Industry Standards Organization (NISO) 3.0 Digital Talking Book (DTB) file specifications in whichever accessible format is most appropriate for that student and to provide navigation and control to employ the capabilities provided by the new format and to provide simple, efficient tools for creating these books.

Project staff: Larry Skutchan, Project Leader
Keith Creasy, Programmer
John Hedges, Programmer
Rob Meredith, Programmer
Jane Lyons, Advisor

Background. The need for a program that supports multiple output media arose from several sources, including APH's and other accessible media publishers' desire to efficiently produce textbooks in the medium that best meets a student's needs. Such a task requires intelligent software and a file format that is both universal and expandable.

The first step in creating such software is to identify or define the file format that best supports the characteristics required by all the output media types. Careful analysis and a worldwide trend to the extensible markup language (XML) convinced staff that this file format provided the structure, features, and extensibility required. The existence of math markup languages such as Math Markup Language (MML) and LaTex also provide the possibility of integration into the final file format. XML uses a Document Type Definition (DTD) to define the vocabulary for a markup language, and these DTDs can become quite elegant and elaborate. Creating one from scratch is not a trivial task.

The National Library Service (NLS) is also striving to define the file format for digital talking books of the future. They assembled a committee to study DTDs and requirements for digital distribution of talking books in the United States. The committee comprises directors of talking book libraries from around the world, alternative media producers, e.g., the Digital Audio Information System (DAISY) Consortium, schools and training centers, and experts from the World Wide Web Consortium (W3C). Though the production and distribution of talking books within the United States remains the central goal, the committee wishes to define characteristics of a file format that will also provide compatibility among countries and the flexibility needed for expansion. Assistance from the National Information Standards Organization (NISO) led to the committee's selection of the NISO Digital Book Document Type Definition.

Having attended the meetings defining the standards and insuring APH's interests were represented, research programmers gathered information regarding the issues and technologies and wrote specifications for a software package utilizing the NISO Digital Talking Book Document Type Definition and those standards that enable the integration of the audio representation of materials into whichever medium the student desires.

The package, Book Master, also provides services to make it simple and efficient to create such a book. Keeping all this in mind, staff are also aware that using a hand held device like the Compaq iPAQ or other personal digital assistant (PDA) to read digital talking books is also required. Staff continually monitor the progression of the Linux operating system and insures the code runs under Microsoft Windows Consumer Edition (CE) which is the operating system many of these PDAs use.

Project staff investigated present technologies, emerging platforms, and small handheld devices, deciding ultimately to use direct control and manipulation of the World Wide Web Consortium (W3C) Document Object Model (DOM) with as little dependence on Microsoft specific features as reasonably possible. Staff recognized that the Linux operating system could become a critical component in the handheld device market, so the programmers studied cross platform issues. Project staff studied the NISO and DOM specifications, looked up references to interfacing to the DOM through the Internet Explorer control and from scripting languages, studied the Synchronized Multimedia Integration Language (SMIL) specifications, and created a working prototype application.

Programming staff developed a Microsoft Foundation Class (MFC) Multiple Document Interface (MDI) application that reads DAISY 3.0 files and lets the user read them with large print, contracted braille, synthesized speech, and digital audio recordings of speech. Outputting the book to large print and embossing to a braille embosser are also in the program specifications, but that functionality is not yet available. This software makes extensive use of the new digital audio components (see separate write-up) and the APH Speech Environment (ASE) (see separate write-up) to provide digital audio recording, playback, and navigation services and speech functions.

Work during FY 2001. Staff continued to participate in NISO and DAISY consortium activities, and, as they learned more about specific APH requirements, ensured specifications were defined to meet these requirements. Programming staff developed algorithms compatible with all DAISY book formats, and which ultimately greatly simplify the process of creating a new book from an existing recording or live narration.

Creasy created a view menu and algorithms to display a DAISY book in whatever formats the book supports. He also created a navigation control that displays the book's Navigation Control file in a standard Windows tree view control. He then added functionality to edit the labels in the Navigation tree and write the results to the Navigation Control file. This makes the process of creating a new book from an existing recording or from live narration very simple.

He wrote algorithms that feed the braille translation object a paragraph at a time. Earlier versions fed the translation object the entire work at once, but programmers quickly realized that a much more efficient and flexible technique is to keep a running translation, including formatting considerations, up to the paragraph before the cursor, then translate only what is left to display on the screen from the beginning of that paragraph down toward the end of the book.

This part of the translation, of course, must be recalculated with any change in the text, but cursor movement activities, except when the user option, "Do Not Translate Current Word" is set, require no call to the braille translation object, and this functionality was incorporated into the project. Staff also noticed that translation times quickly become a critical component of the equation. Even the choice of interfaces, Microsoft's Component Object Model (COM), introduces overhead not originally realized. An approach that supports multiple interfaces is probably the solution to follow in this situation, and staff will investigate and make determinations on the results of those investigations. It is expected that additional in process threads of execution will be used, but the investigating team wants to explore all possibilities including other cross platform libraries.

Creasy wrote algorithms to let the user place a navigation mark for level headings and insert the time information for the associated audio into the control with a default name that can be changed by the user. He wrote support for heading levels 1 through 6, paragraphs, and pages. These functions work both in real time and during the playback process, so there are several ways to mark up a book depending on the source material.

Creasy wrote support for importing files of various formats and incorporating those files into the book. He wrote functions to create a new book and use an imported file as part of that book or to record directly into the book. He also added controls to control the record, playback, navigation, and view switching functionality. This includes intelligence to tell if a book has been marked up at the paragraph level, and if it has not been, provides navigation to the paragraph level through the phrase detection algorithms in the digital audio component.

Creasy added book mark support to Book Master, so the program remembers where the user last read in a particular book, and he added support so that each book maintains the windows and positions of those windows.

He wrote functions that allow the technician to view and/or edit the source file that controls the DAISY book. When the user selects the edit option in the View menu, he sees a submenu of all the files contained in that book, and he may go directly to any of those files to view the underlying tags for that particular file.

Creasy designed dialogs to gather information about a book's metadata and he wrote routines to save this information with the book. The metadata provides the information that lending libraries and other entities use to identify books at a user's request.

He added support for importing text files into the DAISY format and wrote controls and supporting algorithms to enable speech synthesis as a method of reading the book. These text file importation features, for the first time, let producers directly import text files with a default intelligent interpretation of the information contained within.

Creasy began support for importing HTML as a foundation for the book where the software actually builds the XML and NCX files straight from the HTML source.

He wrote functions for navigating through the large print view of the book including single character, screen line, sentence, paragraph, page, and directly through the navigation control contents file.

Creasy began writing functions that interpret the user adjustable tags (like footnotes, page numbers, and producer notes), render the book with respect to those elements, and gather user preferences for those elements. These user preference functions, of course, were accompanied with user interface facilities to support them.

Creasy kept code and sample books current with revisions of the Daisy/NISO specification which has been under development.

He added an audio view that allows for presentation and better control of audio material.

He added features for recording and marking up audio to the DTB3 specification.

He added the ability to import raw audio files and create a very basic DTB3 book.

He continued research and development of text presentation and editing features for future implementation.

Programmer John Hedges created a setup program to install Book Master and its components. This project involved a number of determinations about the user's system capabilities, the components to be installed, and the shifting requirements of the Microsoft platform. Programmers are also aware of the need for simple, reliable implementations of the setup process and the need to support multiple platforms. Current solutions to these issues are multiple editions of the emerging software. Those that do not support the core requirements, or those that do not know if their systems don't conform to the minimum requirements, will be offered the opportunity to install the components that make it possible to perform the requested operation. One solution to this situation is to provide server side components that track, record, and report configuration information then send the needed components upon request.

Consultant Richard Sizemore designed a braille font for use on the screen display for the translated version of the book. This font lets Book Master provide an accurate interpretation of the way the braille formats on a specific page.

Skutchan wrote documentation. This includes both the documentation designed for the end-user, and that for the producer, too, including a variety of recording situations.

Work planned for FY 2002. The programmers will continue to write code that performs the functions and capabilities outlined in the specifications. Hardware drivers, tactile graphics reproduction capabilities, and library management functions are among the more time consuming components remaining.

Programmers will write a new Windows printer driver to address the deficiencies in the generic text driver provided with Windows that will permit embossing with a variety of devices.

Cursor synchronization functionality between the normal or large print and the braille view will be written, tested, and introduced into the product. This will involve work both in the two views from within Book Master, and some additional functionality to the braille translation object (see write-up on ASE). This is the feature that keeps the cursor on the same text in both views, and it is expected to be a powerful tool in the editing, markup, and proof reading process. On the Book Master side, this includes caret placement, position tracking, and screen rendering. The programmers will also add cursor selection, cut, copy, and paste algorithms.

Programmers will develop refreshable braille drivers for several popular commercial displays. It is expected they will use the open source Braille Application Programming Interface (BAPI) begun as a project at Microsoft to provide a hardware platform for such displays under Windows and now maintained by Stone Soup software. APH will gain the immediate use of a solid programming interface and actual functionality for some devices and will add support for several more specific devices including some of the more portable ones that are candidates for use on hand-held devices. These drivers will allow blind professionals to participate in the editing and proof reading process and make it possible for blind students to read the text books in contracted or uncontracted braille. These drivers also make it possible for trained and qualified proofreaders to make corrections directly to the master file.

Programmers will develop tactile graphics embossing support and applicable drivers for the corresponding hardware. This work includes an analysis of the requirements and capabilities of the available devices. While several devices support the capability to provide simple tactile graphics, others, like the Tiger 1000, support capabilities way beyond what previous devices have supported. The programmers will examine the feasibility of creating drivers that use one image and provide code that transforms the vector graphic or bit map image into a series of printer escape sequences that gracefully degrades or expands as the device's capabilities degrade or expand. If feasible, the programmers will write such drivers. If it is not feasible to support the use of a single image for all possible devices, programmers will write specific drivers for specific devices and add the capability to select among images given the specific output device.

Programmers will implement several functions that add XML tags to the selected text in an existing document. An interface, probably implemented as a menu item in Book Master, will show the user the available tagging options, and the programmers will develop this interface and underlying functionality. When the selected text gets tagged, Book Master will update its display to show the user the effects of the tag he just added.

They will write formatting algorithms for both the large print and braille hard copy options. These formatting functions require the material to be rendered with respect to the style sheets in use and any XML tags that may include a "media" attribute that could include or exclude parts of a book.

They will add image display support. This may include intelligence to select an appropriate image based on the media output.

They will add functionality to the braille translation component to support forcing characters to upper case in the reverse translation, respect XML tags to control the formatting and translation process, and work on stylesheets that take braille's unique formatting requirements into account.

They will add cursor synchronization to the source view, so a technician can move the cursor to a place in the book, move to the Edit Source menu, and have the cursor appear at the correct place in the source file.

They will implement the user note options that let the user highlight and make notes. Specifications call for these notes to be portable between players, so that functionality will also be programmed.

The APH Speech Environment (ASE) needs to be updated to support Cich Edit controls and the HTML document object model, and those features are on the books for the ASE project.

They will incorporate library check-out and check-in facilities and remote server support. This makes it possible for two editors, both in remote locations, to work on the same book. This collaboration process is expected to be an effective means of getting more complex books to students more quickly.

Finalizing the large print and braille markup is the top priority for the beginning of the new fiscal year. The project staff expect to begin limited in-house field testing of the large print markup, reproduction, and user interface functionality during the second quarter, and revisions, enhancements, and suggestions will be solicited, revisions will be made, and the information/revision exchange will continue until the product is tested for stability, efficiency, production and customer satisfaction.

A version of Book Master that focuses on digital audio will be field tested, revised, and released this year. This product may take the form of one program for reading that will be available at low cost and another version, with all the creating facilities, that will be made available for a somewhat higher price.

Math Flash (completed)

Purpose: To develop a talking software program that provides math drill and practice in a flash card format

Project staff: Larry Skutchan, Project Leader
Rob Meredith, Programmer
John Hedges, Project Assistant
Rodger Smith, Project Assistant
Kristopher Scott, Project Assistant

Background. Math Flash is a talking software program that runs under Windows. Professionally narrated digitized speech and an animated character present math problems in a flash card format and respond with fun positive and negative feedback. The program lets the teacher specify the kinds of math problems to use and the ranges of the numbers. It allows the use of the four basic arithmetic functions in any combination, as well as the use of positive and negative numbers. The teacher can also allow division with or without remainders. Math Flash generates the problems randomly, or the teacher can use specific problems and save the preferences to disk. The program offers three main modes of presentation. Drill mode allows the student to practice problems and offers feedback after each answer is entered. Test mode presents the problems, but does not give feedback on the results until all problems have been completed. Auto mode presents problems, pauses for a group of students to shout out an answer, then gives the correct answer and moves on to the next problem.

Final enhancements were completed, documentation was finalized, and the program was field tested. Project staff finalized the documentation, the Setup program, and the code and recordings for the application and prepared the product for production. Math Flash received Quota approval from R&D Committee members and became available from APH in Spring 2000. It has been a tremendous success and captures the attention of children and adults alike, both sighted and visually impaired.

Work during FY 2001. Staff continue to solicit feedback from teachers, parents, and students about Math Flash. Some of the most commonly requested features and functionality include the announcement of correct answers in the test review section of the problem where the student answered incorrectly, and a means of letting the user navigate through complex mathematical equations with the cursor keys, much like one does with a word processing program, except this would be equation processing functionality.

Programmer Rob Meredith added the speaking of the correct answer when reviewing an incorrectly answered problem in a completed test as suggested by user feedback.

Meredith found and fixed a bug where it was possible to enter the negative sign, immediately followed by an "r" for a remainder.

Meredith added code to display the complete version number in the about box.

Work planned for FY 2002. This project is complete. Updates and enhancements will continue as the need arises. APH staff plan to explore the possibility of distributing this product in the general education software market. They are also looking into the requirements for providing the examination and manipulation capabilities designed to help with more complex equations.

Monitoring Technological Developments and Educational Applications (ongoing)

Purpose: To identify and develop microcomputer materials that support educational needs, to monitor technological developments and educational applications of technology, and to disseminate information on current uses of technological aids

Project staff: Larry Skutchan, Project Leader
Rob Meredith, Programmer
John Hedges, Programmer
Keith Creasy, Programmer
Mario Eiland, Programmer
Rodger Smith, Programmer
Sarah Ballard, Project Assistant
Kristopher Scott, Project Assistant

Background. The rapid advances in use and development of software, hardware, accessibility considerations, and educational theories require significant attention. The Technology Group in the Educational Research Department monitors and participates in numerous activities to keep abreast of developing trends and current implementations and encourages trends, policies, and standards that use technology to promote APH's mission. These ongoing endeavors help keep APH personnel knowledgeable and influential in the areas of regular and assistive technology.

The Technology Group stays informed through participation in numerous listserves focusing on programming and accessibility issues. The group actively uses and beta tests pre-releases of operating system code, key applications, active accessibility, Java Swing components, and screen enlargement and speech or braille output accessibility aids. The group attends conferences, presents products and activities, and demonstrates APH products related to technology. The Technology Project Leader is also a member of the DAISY Consortium to help ensure that APH is ready for the conversion to digital talking books and that APH is represented in the shaping of guidelines and specifications.

In its efforts to influence direction, the Technology Group creates software for both internal research and use as direct products, applies expertise to help make APH effective and accessible in its production of braille and large print and its application of new and emerging technologies to these processes, and disseminates information to APH and directly to users. The group promotes accessibility within APH by establishing techniques that make the entire company accessible.

Work during FY 2001. The Technology Group continued to participate in beta testing, monitor listserves, attend conferences, collaborate with other developers, and disseminate information. It also continued to study effective means of combining APH's large print and braille areas to accommodate digital text and digital talking books.

Technology staff provided advice and expertise at Product Review Committee sessions and evaluated products submitted to APH for possible production or sale, helped ensure the accessibility of APH's Web site and online ordering systems, and participated in modernizing APH's recording studios. The Technology Group helped produce a digital talking book in the DAISY 2.0 format.

The group also upgraded the computers and software in the Department of Educational Research and continued implementation of a plan that would replace all the machines in the department in a three-year cycle.

The Technology Group regularly provides advice and technical assistance to APH's Business Contract Department and meets with staff from Customer Relations to familiarize them with new products as they near their introduction date. The Technology Group also worked with Customer Relations to develop a process and the software to support the process for issuing user registration codes electronically. Staff updated the registration code generation program to add Teacher's Pet, Book Master Reader, Book Master professional, APH Studio Recorder, Termite Torpedo, and Speaking Speller to the list of available programs. Staff regularly consults with and assists with technical assistance or information requests via phone and email.

The technology group created an installation program for APHont, the low vision friendly font created by Low Vision Project Leader Elaine Kitchel.

Staff coded the ISAVE project into HTML.

Project staff maintained and updated the demo CD that contains demonstrations of software, product information, and in depth audio demonstrations of software and hardware narrated by experts from the department on that product. The CD interface is HTML based, so it is also used on the APH Web site.

A single classroom site user license agreement was developed for use with all the new APH software products.

Project staff continued creating APH's own animated characters for use with several APH educational software packages. A guide dog and a spelling bee are two of the main characters under development.

With three staff members on the DAISY Mark Up and Specification team, the group actively used the specifications and worked to improve weaknesses in the specifications. The project leader is a member of the File Specification group of the American Foundation for the Blind's Solutions Forum, the Kentucky Department of Education's Computerized Testing task force, and a member of a task force designed to study tools and techniques that help publishers meet the needs of blind students when providing electronic files of their textbooks.

The technology group helped disseminate information by presenting at the following conferences:

Closing The Gap (CTG), where Larry Skutchan and Keith Creasy presented a session on interactive keyboard training for blind and visually impaired students and adults using Talking Typer for Windows. See the separate write-up on Talking Typer for Windows.

Assistive Technology Industry Association (ATIA), where Larry Skutchan and Rob Meredith made a presentation on the APH Studio Recorder software and the decision process involved in electing to develop custom software instead of using some of the off-the-shelf applications created for recording and editing digital audio. (See the write up on the Digital Audio Component.)

Digital Audio Information System (DAISY) Technical Conference, where Larry Skutchan and Keith Creasy made presentations on Book Master and hosted a table in what the conference called the "play room" where DAISY related technology was on display to other participants. See the write-ups for the digital audio components and Book Master.

California State University at Northridge (CSUN) Conference, where Larry Skutchan and Jane Lyons made a presentation on the Accessible Textbook Initiative and collaboration (ATIC) project and its relation to DAISY and Book Master.

Council for Exceptional Children (CEC) conference, where Jane Lyons and Larry Skutchan made a presentation on ATIC and Book master.

Gateways 2001 conference, where Larry Skutchan and Rodger Smith conducted two workshops highlighting new technology from APH.

2001: A Technology Odyssey, where Larry Skutchan presented a session on the digital audio components and APH's direction with DAISY. He also conducted another presentation entitled "Interactive Keyboard Training Using Talking Typer for Windows."

Jefferson County Teacher Training Workshop, where Mario Eiland conducted a workshop on using scanning and braille translation technology to create handouts for blind and visually impaired children in the Jefferson County Public schools.

"A New Day, A New Paradigm: Accessibility for All Using IT" Emerging Technology Symposium 2001, where Larry Skutchan presented "Universal Design Concepts for Web Authors".

DAISY technical meeting, where Keith Creasy presented a demonstration of Book master.

Work planned for FY 2002. The Technology Group will increase its involvement in digital document access, web streaming technology, universal design concepts, and alternative user interfaces; ensure critical accessibility of system components and emerging systems;

disseminate information and advise government, manufacturers, and consumers about accessibility issues; and develop high quality, educationally sound software solutions for blind and visually impaired students and adults.

The Technology Group will continue to pursue ways of applying technology to the production of tactile graphics, help educate other project leaders in the Department of Educational Research, and look for ways to use technological solutions to further APH's mission. The group will pursue funding for special projects and experiment with emerging technologies. The group also plans to continue expanding the APH network site license and pursue additional text-to-speech engines for possible distribution.

The technology group plans to work closely with the new Test Central project by providing technological solutions to test access issues as defined by the Test Central project. Advise, review, support, and software design and development are among the expected activities that will connect the technology group and test central.
More involvement with the Linux operating system and the accessibility developments in the console, X Windows, and GNU Network object model Environment (GNOME) are a high priority. Staff is especially interested in Speakup, the Linux kernel screen access program and its compatibility with software text-to-speech systems under Linux. The primary developer, Kirk Reiser, and research scientist Larry Skutchan have been in contact to discuss features and future directions. Reiser points out that the cursor tracking routines and the software speech interface are two of the program's greatest deficiencies. Skutchan's experience in cursor tracking algorithms under DOS with the ASAP screen reader make this aspect of the programming a natural for him, and Reiser's familiarity, as the primary author, with the speech interface and kernel functionality makes the software speech interface a sensible task for him. Such an arrangement means the availability of a top quality access system capable of running on personal digital assistant devices. Speakup is developed under the GNU, which is a method of software development where you are free to use and distribute the software and contributors to the application make their work available for future development on the project. APH will become more active in this kind of development with this GNU project and with some open source projects called the Braille Application Programming Interface (BAPI) which is a set of standards and interfaces for putting a refreshable braille display in Windows and possibly with a project with SUN Micro Systems corporation introducing accessibility functionality in the Netscape web browser including a Linux version of the browser.

Motion Pad (completed)

Purpose: To provide a device that detects motion and alerts the user with a recorded message

Project staff: Larry Skutchan, Project Leader
James Robinson, Manufacturing Specialist/Technical Research

Background. The idea for a device to alert blind or visually impaired persons about an object or to notify them about an event resulted from a discussion at APH in which it was expressed that APH needed a device that would detect motion and alert blind employees to the presence of carts or other obstacles. James Robinson began designing such a device and made a working prototype. It was discovered that such a device already existed and is manufactured by Attainment Corporation. APH personnel contacted the company to determine their interest in providing a modified unit for APH. The new unit would offer highly contrasting color keys, a more secure fastening mechanism, accessible documentation, and protection against inadvertent or malicious alteration to the recorded message. After studying costs and manufacturing issues, Attainment Corporation decided to make the proposed modifications to its base unit. The manufacturing process now includes the new case and button colors and the message locking mechanism. Attainment supplies the new fastening mechanism, and APH provides the documentation.

Work during FY 2000. APH staff tested the newly modified units, but found minor hardware problems. Representatives at Attainment and APH studied the problem and decided the behavior was not exactly what they wanted, but that it was such a small issue that the situation could be addressed in the next production run. APH staff wrote a clear, concise booklet to accompany the unit. When APH receives a shipment of motion pads, the Educational Aids Department adds a large print and cassette version of the booklet to each box.

Work planned for FY 2001. This project is complete, and no further enhancements are planned at this time. This is a nonquota item.

Road Runner: Phase I (completed)

Purpose: To provide a small handheld that effectively uses synthesized speech to read electronic books.

Project staff: Larry Skutchan, Project Leader
Steve Gomas, Programmer

Background. APH staff and experts in the field became very interested in a small handheld commercial product that uses synthesized speech to read text files sent from the user's PC to the device. While the unit was not specifically designed for use by blind consumers, its characteristics made it perfect for such a market. There were, however, several software and hardware modifications that could tailor it for use by blind students and adults, and APH and Ostrich Software, maker of the Road Runner, began collaborating to achieve this result. The scope of the work dictated breaking the project into three distinct phases. The first phase alters the keyboard to eliminate the function names and, instead, use highly contrasting numbers such as on a telephone. This change facilitates the modifications outlined for phase two of the project. The firmware will also be serialized in a range of numbers so that APH can offer its users updates to the machine through the Web or other electronic distribution. Phase 1 of this project is complete.

Phase two involves changing the user interface. These changes include both additional commands to permit more complete navigation and review facilities and to support these features in a wider variety of kinds of text both through the direct importation of more file types and through the ability to identify specific kinds of text. Refreshable braille support is also a strong consideration.

In addition to these firmware enhancements, the software that the user runs on the PC will be modified to allow partial downloads and to allow adding files to the queue directly from Windows Explorer or the context menu.

Customers who purchase Road Runner units containing the initial firmware will be able to update their units with the firmware that results from phase two of this project.

Phase three of the project will involve significant hardware modifications to enable additional functionality.

During phase 1 of this project, Staff consulted with low vision experts and decided on a high contrast keypad design that uses yellow numbers on a black background. The keypads were modified, and the programmer changed the firmware to identify it as APH's. Modified units were ordered and became available from APH in April of 2000.

The initial units are essentially the same as the commercial Road Runner and so were made available as a nonquota item. With field testing and phase two modifications molding the

Road Runner closer to the needs of blind and visually impaired students with some impressive structural, navigational, and braille features, the unit will be presented to the Research and Development Committee for possible quota approval.

Work during FY 2001. Staff wrote program specifications and submitted them to Ostrich Software for implementation.

Programmers began foundation coding for some of the new capabilities outlined in the specifications. These included underlying support for the incremental download feature and some of the structural navigation functionality.

Programmer Mario Eiland wrote a reverse translation table and enhanced the existing English to contracted English braille table for the braille translation component (See writ-up on ASE.)

Programmer Keith Creasy made modifications to the braille translation object (see write-up on ASE) to support additional features required.

Project Leader Larry Skutchan began work on the new Road Runner's documentation.

Work planned for FY 2002. Programmers will complete the structural supporting code in the firmware revisions and write the more high level functions to support the new capabilities. Earlier models of the unit compress and encode the text as a single unit before it is transmitted from the PC to the Road Runner. With the new incremental download capabilities, it is necessary to compress and encode only new material that is prepared for the unit while leaving the previously encoded material in tact. It is also necessary to write hardware static memory drivers that use one of the banks of RAM as a holding and transfer station while removing or re-arranging existing text to make room for new additions.

Programmers will write Refreshable Braille display drivers, and a navigation and display interface for the hardware.

Programmers will complete the new transfer software that runs on the PC. This includes adding functionality and user interface for specifying how the book should be arranged. A check box like "Respect Line Breaks" may be used in the Add Files dialog.

Staff will complete the documentation.
Staff will submit the work for evaluation through field testing. Appropriate modifications will be made based on field test results and the revised Road Runner will be submitted to the R&D Committee for possible Quota approval. The new unit will be made available in FY 2002.

Speaking Speller (new)

Purpose: To provide an accessible software package that provides blind and visually impaired students with practice drills and spelling tests

Project staff: Larry Skutchan, Project Leader
Mario Eiland, Programmer
John Hedges, Project Assistant
Keith Creasy, Project Assistant

Background. In May 1998, the Product Review Committee supported the idea to develop a spelling drill and test program. The Technology Group and customer service representatives have received several requests from the field for such a program.

APH staff wrote program specifications and decided on the programming language to employ for this project. Specifications include an accessible interface of speech and large print that present the spelling test to the student in a manner similar to a spelling bee. The word is pronounced, used in a sentence, and repeated. The program will include APH's digital recording and playback component, and if the teacher decides to record the word and the sentence, the program uses that recording. Otherwise, it uses synthesized speech to announce the information. The software accepts typed input and responds in one of several ways depending on how the student spelled the desired word and in what mode the program is running. It also supports navigation commands to let the student move on to view other words in the spelling list. The program uses the network login to identify the user, and there is an optional logon control to identify various users in a stand-alone machine configuration. The program also keeps records on student progress and provides a mechanism to examine and edit these records. Speaking Speller will use the same audio responses already recorded for Math Flash, and additional responses will be created. It will also use the Microsoft Agent animated character functions as used in Math Flash. The programming staff began work coding the prototype of this program. They began working on the storage and retrieval routines, user interface, word listing and editing functions, and algorithms to open and identify Speaking Speller document files.

Work during FY 2001. The functions begun in the previous year were all completed, and programmers continued adding functionality.

Graphics artists created a base drawing on which to build an animated bee character. They also animated several of the required sequences.

Programmers added support for the animated character that guides the student through the exercises.

Work planned for FY 2002. The prototype of this project will be completed, and project staff will conduct extensive testing in various environments before submitting the program to field

testing. Staff will write documentation and design a field test questionnaire. Any corrections and reasonable requests from the field testers will be implemented, and the revisions will be

submitted back to field testing. After field test results have been compiled and analyzed, Speaking Speller will be submitted to the R&D Committee for possible Quota approval. Staff will prepare the program for production and the product will become available.

Talking Learn Keys (completed)

Purpose: To provide a Windows-based basic keyboard exploration program for visually impaired or blind users so they may become familiar with any computer keyboard or to hear keystrokes announced in applications

Project staff: Larry Skutchan, Project Leader
John Hedges, Programmer
Rob Meredith, Project Assistant

Background. Talking Learn Keys provides clearly recorded audio feedback about keys that users of any age type on the PC keyboard. It can be used in two configurations. In the first, the user can type any key on the keyboard without fear of doing something wrong because Learn Keys processes the keys before they are presented to the system. In the second, the learner can use Talking Learn Keys to announce keys for any program on the computer. This can be useful for providing high quality feedback for number entry in data processing applications or simply to verify the user is typing properly in any application. The program uses prerecorded speech from professional narrators and allows the user to choose either a male or female voice. There are also options for fast or normal speed announcement of key presses and a pronunciation mode feature that allows various pronunciations of some of the special keys. A large Verdana font type is used to display the key name. This feature is adjustable from the menu.

The idea for Talking Learn Keys was discussed and presented to the Product Review Committee, who approved development of the program. The technology group in the Department of Educational Research developed initial design specifications and a functionality features list. The programmers wrote, tested, and finalized the code in 1999, and Learn Keys became available.

As the group continued the development of the APH Speech Environment with its new abilities to manage user registration, it decided to update Learn Keys to take advantage of this capability. This also allows the program to be placed on the Web in a demo version.

Work during FY 2001. No additional programming was required, but some enhancements are possible.

Work Planned for FY 2002. This project is complete.

Talking Puzzles (new)

Purpose: To produce an accessible educational game on CD that uses hidden word or crossword type puzzles

Project staff: Larry Skutchan, Project Leader
Rodger Smith, Programmer

Background. The need for an educational type of game like hidden word and crossword puzzles has been long expressed by customers and experts in the field. APH's Product Review Committee supported the idea for such a project in May 1998, and the programming group began work on the program in FY 2000.

Project staff wrote program specifications for the program. Features planned include an intuitive text-to-speech and large print navigation system through the puzzle grid. The interface includes appropriate, responsive speech and highlighting feedback as the student uses the shift key along with the arrow keys to mark a word in the grid and distinguishable characteristics as the student moves across words already marked. Specifications also call for a creation process that allows the teacher to enter either a list of words or a list of words and clues to those words in the case of a crossword puzzle. This data gets committed to persistent storage and all puzzles get dynamically generated from this information. The group explored the techniques it would use and the programming language selected was Java Script with Active X components for the grid generation activities. The grid generation algorithms take a list of words, a maximum column and row indicator, and a flag specifying the desired puzzle type (crossword or hidden). The generate function returns a variant string containing an array of structures, of which each contains the word number, its position in the grid, and its direction (either vertical or horizontal). The host program then renders the puzzle according to the user's access needs. The programmers wrote the grid generation functions and tested them. They also began work on the host application. Functions to accept a list of words and clues to those words, functions to commit the list to persistent storage and to read them back, and algorithms to preserve user selections and preferences were all underway in FY 2000.

Work during FY 2001. Work on this project was delayed as programmer time was shifted to other projects.

Work planned for FY 2002. The programmers will complete the coding of the product specifications, and research staff will run internal testing before submitting the product to the field test process. Staff will write documentation and design the field test questionnaire. The programmers will correct any problems discovered in field testing, add any reasonable requests, and submit the modifications for further testing.

Talking Typer 2.0 (new)

Purpose: To extend the capabilities of Talking Typer with additional features and functionality as suggested by users of Talking Typer 1.0

Project staff: Larry Skutchan, Project Leader
Keith Creasy, Programmer
Kristopher Scott, Project Assistant

Background. While Talking Typer 1.0 has been a tremendous success, staff has received from the field several suggestions for features and enhancements users wish to see incorporated into the program. A most popular request is the addition of support for one-handed typists. After an investigation into available and possible solutions to this, staff decided to use a multi-pronged approach with two techniques; one that uses the middle of the keyboard as the home row, and the DVORAK one-handed keyboard layouts that ship with Windows as the method for providing this functionality. Normally, this would be no problem, because once the user changes the system's keyboard layout, Talking Typer works fine. New lessons to support the DVORAK remain to be written. The difficulty is that when a new user learns a new keyboard layout, that person is seldom ready to change his or her whole system to that layout until some familiarity with it has been gained. Fortunately, Talking Typer already uses its own internal key mapping table. This makes the program flexible enough to be able to perform this task with fairly minimal effort. Another strong request from the field with this revision is the addition of more multi-media components. The programmers plan to restructure the drill and lesson editing features to support the Internet Explorer HTML control. This will create the flexibility to include nearly unlimited kinds of elements into typing lessons.

Staff created a key mapping file for testing new routines that had been added to allow the user to type with the new keyboard layout without having to actually change the system layout.

Staff began creating a new set of lessons for DVORAK one-handed layouts (both left handed and right handed) and a two-handed DVORAK lesson.

Work during FY 2001. Staff presented the idea for version 2 of talking Typer to the Product Review committee, and they approved the project.

Programmer Keith Creasy created new lesson editing facilities so that when the teacher or user stops, and he wants to edit the lesson, the editing cursor is placed at the point in the lesson where the student has progressed.

Creasy wrote algorithms to display the lesson content in an HTML window.

Work planned for FY 2002. Project staff will change the method of dictation recording and playback with the APH Digital Audio Recorder and adjust the host application to capitalize on some of its new features. Enhancements will be made to the lesson editing feature, and further

modifications to the drill feature will improve interactive features and allow easier adaptation of the program to suit an individual's specific keyboarding needs.

Talking Typer for Windows (completed)

Purpose: To provide accessible, interactive keyboard training on the Windows platform

Project staff: Larry Skutchan, Project Leader
Keith Creasy, Programmer
Rob Meredith, Project Assistant
John Hedges, Project Assistant
Rodger Smith, Project Assistant
Kristopher Scott, Project Assistant

Background. Talking Typer for Windows is a program based on two former APH products, the Talking Typer for Apple II and PC Typer. Like its predecessors, Talking Typer for Windows includes features that allow users to create and modify drills and dictation exercises. It also includes features for recording and storing, and examining student records and performance statistics. The program also contains a fun game with scorekeeping capabilities. After completing program specifications, a basic framework of the project was created. Program specifications included the features from the DOS-based PC Typer plus additional features identified by users of the previous version. Enhancements to the previous version are (a) the program is self-voicing, so no screen access program or speech synthesizer is required, (b) new students automatically receive a default list of lessons, (c) support for special computer keys is included, (d) the program includes the ability to record and playback dictations, (e) software is completely network ready, and (f) teacher management and lesson activities are combined into one program with password restricted access to teacher privileged functions like record manipulation and default settings. The program entered its field testing phase in September 1999.

The programming group field tested Talking Typer over a six-month period in a variety of sites, and the field test participants played a very active role in shaping the development of this product. Field testing began in September 1999 with an early prototype of the system and the programmers quickly replaced features that were difficult to understand with methods suggested by participants.

The field testers and customers suggested adding some lessons that used common phrases. Thus two new lessons comprising a total of 40 phrases was created. Customer feedback indicates these were a great idea and several users requested the two phrase lessons be renamed "Sentences" and two create additional lessons that come before the sentence lessons that contain shorter, more common phrases.

Errors within some of the original lessons were corrected, and staff updated the master to make the corrections part of the standard lessons included with Talking Typer.

The field testers also decided that the pace of the Hurry Scurry game was too fast.

Thus, the code was revised to gauge its speed increases on the student's capabilities, and an option was added to the Preferences dialog that allows the teacher to slow down the speed even further if desired.

The staff continually refine and improve the program, and each of the new versions is tested and distributed with the new production run. Talking Typer for Windows has been a tremendously successful program, selling well over 1000 copies per year.

The following enhancements and corrections were made to various versions of Talking Typer for Windows:

Version 1.0.13

- A problem involving normal user account usage under Windows NT with access to some speech components was corrected.

Version 1.0.14

- Added the ability to copy the Student Results information to the clipboard for possible later pasting into another application. This helps with reports and other record keeping activities.
- Added an Automatic Stop feature to dictations. This works by automatically pausing the recording when the student begins typing. After a short time from when the student stops, playback of the recording continues. You may, of course, continue to use the Control keys to pause, rewind, and play the recording.
- Keystrokes are now echoed in Dictations, Open Typing, and Explore the Keyboard if the Echo Keystrokes button is checked in the Preferences dialog.
- The Setup program was updated to correct a problem that occurred when you had a demo version installed then tried to update with the registered version on the CD if that registered version was older than the demo. Now, if the demo is newer than the registered version, Setup updates the information that registers the program and keeps the newer software in tact.
- Corrected a problem that occurred when Hurry Scurry ran in Windows NT.
- Corrected a problem that prevented a lesson from saving with the Save option on the File menu. The program still saved the lesson when you closed the lesson, so there was not a data loss problem.
- There was an "V" in the Capitals and Period lesson that shouldn't have been there.
- There was a word misspelled on the Phrases II lesson.
- Talking Typer now accepts the /L command line switch. This creates a debug log file that records information about what the program does in case of errors. The file is named **debug.log** and is located in the same folder as the program.
- Corrected a corrupt file problem in one of the lessons.
- Corrected Setup issues for Windows NT 4, including Administrative rights, Service Pack detection, and Auto Check (CD auto-play) problems.

Work during FY 2001. The following features and corrections were made to Talking Typer for Windows.

Version 1.1.0

Programmer Keith Creasy added the option and support code for using digitized speech as the voice for all keys spoken as letters. This addresses a frequent complaint that some letters were indistinguishable from others with the default text-to-speech engine provided with the product. He also added an option in the Preferences dialog, which defaults to "Digitized," allowing the user to select digitized or synthesized speech for spoken keys.

He upgraded all the audio recording components to use the digital audio record and playback control. This includes display of the peak meter during recording dictations.

He altered the internal structure of the Talking Typer file type. The new format treats all dictation recordings as external files named after the original file with a number added for which dictation in the lesson the recording represents. This change also adds the capability to drop external recordings in as dictation exercises for a particular lesson.

Version 1.0.23

Creasy corrected a problem with the display of the ampersand character in the Explore Keyboard section of the program.

Version 1.0.22

He corrected a recently introduced problem with the user name display.

Programmer John Hedges updated Setup to correct issues with Windows 95 that resulted from system component updates.

Version 1.0.21

Hedges updated the Setup to correct an error message during Windows NT installation. The Service Pack 6 is now required, but the message mentioned Service Pack 4 in error.

Creasy corrected a rare error in processing the default user login name where the computer was identified on the network as a string of space characters. Earlier versions of Talking Typer immediately exited on this condition, but this version assigns the user a default name of "Default User."

Version 1.0.20

Updates were made to the keyboard virtual key map, allowing the program to enunciate letters to be typed in lower case.

He updated keyboard hook (tthook.dll) processing of the F1 key.

He corrected a problem concerning the processing of special keys during Edit Lesson.

Version 1.0.19

Creasy updated timing processing for more accurate short drills.

He added version information to the About dialog including versions for the components the software uses.

Version 1.0.18

Research Assistant Kristopher Scott corrected occasional errors in lessons.

Creasy corrected a problem in the Edit Drills dialog where the Edit Lesson button disappeared after switching from editing dictations back to editing drills.

Work planned for FY 2001. Talking Typer version 1.0 is complete. [See Talking Typer 2.0 regarding future directions.] Maintenance issues continue with this product, and users continually request enhancements. Perhaps the number one complaint with the program is the quality of the synthesized speech. Staff will determine a means of addressing the speech and other issues that do not require major re-writes until the release of Talking Typer 2.0. One solution to the speech problem under development is adding digitized speech to those areas in the lessons that call for letter by letter pronunciation, the most difficult part of the synthesized speech to understand. Another option is offering the customer a version of the program that contains a more high quality speech synthesis program and making the price reflect the additional cost of licensing that program. The staff are also examining other text-to-speech engines for possible use as an additional product the customer could by, then use with all of the educational software packages from APH.

Teacher's Pet (continuing)

Purpose: To develop a program used to both create and take tests or drill and practice sessions, and to provide student progress record keeping.

Project staff: Larry Skutchan, Project Leader
John Hedges, Programmer

Background. APH has long been interested in providing an accessible means of creating and delivering test content to blind and visually impaired students. An early attempt at this goal, Teacher's Pet for the Apple II, was a huge success. Members of Educational Research continue to receive requests for a Windows-based program that would perform similar functions. The group designed a new program to deliver content and record progress using Extensible Markup Language (XML) as its native file format. The design specifications call for software that is self voicing with easily adjustable display characteristics and a simple user interface that provides mechanisms to repeat or more closely examine test material. The program must also store and retrieve student statistics and access settings and provide an interface to make the teacher's job of preparing the test simple through modern drag and drop capabilities for multi-media objects like graphics and sounds. Teacher's Pet must also manage and display student records.

Staff wrote program specifications that include the support for a variety of question types including open-ended, fill-in-the-blank, true-false, and multiple choice.

Programmer John Hedges created a prototype of the application in March 2000 using Javascript as the programming language. (This was APH's first venture into this language in its attempt to identify a language that provides rapid deployment possibilities yet supports accessible design concepts.) He created techniques for providing user interface elements supporting universal design concepts and incorporated the APH digital audio component and APH Speech Environment to provide some of the core services the software required.

The programming team successfully solved a number of access and design issues. The program received such capabilities as an automatic integrated sound recording and playback facility that includes the ability to limit the time of the recording (through the APH Digital Audio Control), Cascading Style Sheet (CSS) support for flexible display adjustment, selection and display routines, a dialog to open and identify Teacher's Pet test files, evaluation functions that are extensible enough to permit a variety of formats for acceptable answers, and functions to preserve and restore user preferences and access settings. The programmers added the user interface and input mechanism that lets the student enter the answer in whatever format the teacher or parent specifies and the dialog and input routines that lets the teacher or parent create the test material. Functions were written to present the question, to navigate from question to question, and to move through long questions as is the case when there are several paragraphs or pages of text to read.

Work during FY 2001. Staff continued identifying and resolving access issues with the programming language. They incorporated the APH Speech Environment to provide the speech

capabilities, including repeat functions, stopping the speech with any keystroke, and the ability to access the Speech Adjustment dialog available in ASE.

Programmer John Hedges developed functions to create, display, and edit five question types. These are open-ended, fill-in-the-blank, true/false, multiple choice, and matching.

Larry Skutchan wrote the documentation.

Hedges developed functions for presentation of drill, test, and continuous modes. These different methods for working with the questions offer teachers or students the chance to practice with the material in either a drill format or a continuous mode, as Math Flash uses, where the question is displayed for a certain length of time, then if no one answers the question, the program reveals the answer and moves on to the next question in the sequence.

Hedges wrote functions to evaluate each of the answer types.
One of the project advisors suggested adding matching as one of the supported question types, and Hedges added that functionality. It is implemented much as the support for multiple choice, except that the answers from the previous question are offered as choices for each subsequent question until the user changes the question type to something besides matching.

Hedges wrote a program to perform the Teacher's Pet installation, and he tested it with a variety of configurations and operating system versions. The electronic distribution edition of the package will be offered either with or without including Internet Explorer as part of the download process.

Hedges wrote and tested a Setup program that optionally installs Internet Explorer 5.5 (which is required to run Teacher's Pet).

He developed and updated question data layout functionality in XML and corresponding XSL stylesheet files to provide a simple, effective presentation of the various question types.

Hedges developed functions to process random or sequential questions and answers and to provide feedback for each answer.

He wrote functions to summarize answers and display results when the student finishes the drill or test.

He created dialogs that include file and file folder processing, Agent character selection, About information, style properties, login processing, and program properties and settings.

He worked with the development of the dual interface to support scripting in the digital audio recording and playback object (see write-up on Digital Audio Component) for playback of inserted sounds or recorded questions and an audio recording dialog.

He developed techniques to create and manage an accessible HTML menu that can be displayed or hidden, and he implemented the menu functionality.

He developed image handling dialogs and placement techniques, as well as image filter processing for low vision.

He wrote speaking and printing functionality that allows the screen content to be selectively processed.

He developed a series of preview Setup package files for evaluation.

Hedges and Skutchan worked with artists to revise and finalize the art work for the CD jewel case, the CD, and program graphics and icons.

Artists and staff created a new guide dog character and the artists created several animation sequences for the character.

Consultant Richard Sizemore and programmer Rodger Smith imported the bitmap files of the animated guide dog into an animation package and tailored the sequences in several ways.

Skutchan, Hedges, and field testers tested the program and its installation procedure in a number of environments.

Work planned for FY 2002. Teacher's Pet will continue to be refined as long as field testers identify issues with the access, style, documentation, content, and stability.

A field test questionnaire will be composed. Once the field test results are evaluated, and modifications have been made and tested, the product will be made available. The product CD will be duplicated, large print and braille versions of the installation guide will be produced, and the product will become available in the first quarter of 2002.

Multiple Disabilities

Braille Rap Song (new)

Purpose: To have a fun and alternative way of teaching Braille 1, particularly to students who are blind and have additional disabilities

Project staff: Tristan Pierce, Project Leader

Background. In July 2000, Lynn Horton, a teacher at the Helen Keller School for the Blind, located in Talladega, Alabama, came to APH and presented an array of products that she had developed for teaching her students who are visually impaired and have multiple disabilities. At that time interest was expressed in her song that teaches braille. At the 2001 Council for Exceptional Children Conference she again presented many of her products, including the Braille Rap Song. Several members of the APH staff attended the presentation. This will be a give-away item. Cassettes will be distributed at conferences and the MP3 file can be downloaded from the APH web site. University students studying to become vision teachers have expressed interest in the song to help them learn braille.

Work during FY 2001. Several singers are under consideration for recording the song.

Work planned for FY 2002. Coordinate the recording and distribution of the song. Projected availability date is fall 2002.

Cortical Visual Impairment (CVI) Projects and Needs (new)

Purpose: To help APH determine both short and long term goals for future research and product development in the CVI field

Project staff: Elaine Kitchel, Co-project Leader, Low Vision
Judy Parks, Co-project Leader, Early Childhood
Eleanor Pester, Co-project Leader, Braille
Tristan Pierce, Co-project Leader, Multiple Disabilities

Background. The need for APH to create a CVI Projects and Needs category was introduced by several APH Project Leaders. Through past experience as a former itinerant vision teacher, Judy Parks, APH Early Childhood Project Leader, identified that research in the area of CVI is one of the greatest needs of the vision field and that early intervention is imperative. The Multiple Disabilities Focus group identified the need for APH to provide a compilation of materials related to CVI. Dr. Lee Robinson, Utah's Ex-Officio Trustee and Publications Committee Chairman, noted the need to have further research in the area of CVI prior to developing a video as a follow-up to APH's low vision product ISAVE. Research is needed on how APH can aid in the teaching of CVI children.

Work during FY 2001. The APH project leaders identified the CVI Synergy Group and the group will meet at APH in September 2001. The Early Childhood and Multiple Disabilities Project Leaders attended a CVI workshop presented by Dr. Christine Roman at the Braille Institute.

Work planned for FY 2002. Proceed with recommendations of the CVI Synergy Group.

Multiple Disabilities Projects and Needs (new)

Purpose: To assess needs, plan research, and manage product development to better serve individuals who are visually impaired and have additional disabilities

Project staff: Tristan Pierce, Project Leader
Will Armstrong, Research Assistant
Kris Scott, Research Assistant

Background. The current Multiple Disabilities Project Leader, Tristan Pierce, began work at APH in November 2000 with a Masters degree in International Administration & Management and a Bachelors degree in Advertising. Related job experiences include over 10 years in publishing, in which six years were dedicated to children's educational publishing and educational product management. While working in Haiti she cared for several children with multiple disabilities. To gain experience in the vision field, she volunteers as an assistant swim coach at the Kentucky School for the Blind.

Work during FY 2001. A Multiple Disabilities Focus Group was created and the group met at APH in March. The group identified a total of 48 product ideas and held detailed discussions on the revision of APH's Sensory Stimulation Kit, the development of a Tactile (Communication) Symbol System, the value of adaptable calendar boxes, and the pros and cons of utilizing teaching aids and methods developed by Lilli Neilson (e.g., the den, position board, little room) for very young children or those with severely deficient motor skills. The 48 product ideas were developed into a needs survey that was distributed through the focus group members, APH Ex-Officio Trustees, and via the postal service to the Multiple Disabilities Division of AER. Survey participants had the option of completing the paper version and mailing it into APH or they could complete the survey on-line and e-mail it directly to APH. Vision professionals from Australia, Bermuda, Canada, Guam, Iran, Spain, and the United States, participated in the survey.

Work planned for FY 2001. The top needs identified by the multiple disabilities needs survey will be further researched and presented to the PRC for development. Two of the products (SSK revision and Tactile Symbol System) are already being developed.

Sensory Stimulation Kit (revision)

Purpose: To redesign the existing SSK to meet current APH and educational standards

Project staff: Tristan Pierce, Project Leader

Background. Upon reviewing the Sensory Stimulation Kit (SSK), the Project Leader recognized that the guidebook was extremely outdated. When a focus group came to APH for an early childhood meeting, the Project Leader asked several participants about the kit. They responded that many of the activities were also in need of revision. The Project Leader presented the revision concept to the PRC in January 2001 and it was accepted.

Work during FY 2001. The Project Leader presented the concept of a complete redesign of the SSK to the Multiple Disabilities Focus Group. The group recommended the introduction of a sensory learning profile that could travel with the child as he/she moves through their educational years. They also recommended that an assessment be included with the kit and that including activities that could be child initiated would be valuable. The recommendations of the group were verified by the results of the multiple disabilities needs survey that was conducted May15 - July 1, 2001.

Work planned for FY 2002. The Project Leader will contract with a consultant for developing the revised kit. A timeline will be developed. With the help of the consultant and the original focus group, a survey will be developed that will focus on items and activities in the current kit to determine what has value and what should be replaced. The survey will be sent to people and institutions that have purchased the SSK in the past several years (approximately 432 mailing labels). The development of the sensory learning profile and the assessment will begin.

Science

Sense of Science: Animals (continuing)

Purpose: To develop a set of materials for blind and low vision students in grades K-3 that promotes active, hands-on learning activities emphasizing basic concepts related to animal life. This is the second module of a planned series

Project staff: Karen Poppe, Project Leader/Co-Author
Emily Bowers, Project Coauthor
Katherine Robinson, Project Coauthor
Will Armstrong, Project Assistant
Sarah Ballard, Project Assistant
Tom Poppe, Pattern and Model Maker
Bernadette Mudd, Cover Artist

Background. *Sense of Science: Animals* is the second module of a planned series intended to make the "world of science" accessible to young students with visual impairments. This new set of science materials will resemble in both content and design the introductory module, *Sense of Science: Plants*, incorporating both fun-filled, hands-on activities and the tactile/visual overlays for use with APH light boxes.

Initial work on the composition of activities and the tactile/visual overlays was begun in 1999. Many of the tactile/print overlays planned for the *Animal* kit were determined and sketched. The Project Leader and the Model Maker worked together to design the best tactile representation of each overlay and to select ideal silkscreen colors for the visual overlays. Some of the thermoform patterns were built.

Concurrent with the development of the overlays, the project leader worked with project authors to develop hands-on activities for the guidebook categorized by animal habitat (e.g., desert, pond life, ocean, rainforest, backyard, etc.). The main components of each activity include the following: the stated objective of the activity, the vocabulary introduced, list of needed materials, a step-by-step procedure, an extension for older students, a math connection, a language connection, suggestions for visual adaptations, and a science tidbit/interesting fact. The format mirrors that encountered in the *Plant* module.

Work during FY 2001. From October 2000 to January 2001, the prototype of *Sense of Science: Animals* continued to be designed: guidebook activities were refined and edited; cover art for the guidebook and outer case were created; lists of appropriate children's literature were compiled for each habitat unit; and the guidebook was typeset employing the same style used for *Plants*. The tactile and visual art for the overlays required the most preparation time; the planned overlays include:Bird (Side View)

- Bird (Top View)
- Butterfly

- Snake
- Ant
- Mouse
- Turtle
- Spider
- Fish
- Life Cycle of a Butterfly
- Life Cycle of a Frog
- Spider Web (Sequencing Cards)
- Animal Tracks

Field test sites were located and prototypes were sent to 10 field test sites; an extensive evaluation packet prepared by the Project Leader accompanied each prototype. Eight teachers from the states of Pennsylvania, Michigan, Georgia, Virginia, Missouri, Tennessee, and New Mexico completed the evaluation, having used the materials with a combined total of 47 visually impaired and blind students. The teachers expressed satisfaction with the scope and appropriateness of the guidebook activities and the tactile/print overlays. As one teacher noted, "Seeing the tactual making sense to my students was the greatest strength." A final report of the field test results was prepared and reviewed by an in-house research committee; appropriate revisions were determined based upon the teachers' feedback. The most significant revision planned was the inclusion of an "exploded overlay" to allow the totally blind student to identify various parts of animal apart from the "whole" tactile representation and to serve as an assessment tool.

Work planned for FY 2002. The project leader will work with the project consultants, an outside illustrator, the in-house graphic designer, APH's Pattern and Model Maker, and research assistants to prepare the final documentation, product specifications, and production tooling needed for the initial production runs. The product timeline will be updated to allow sufficient time for these activities and to accommodate other on-going projects for which the Project Leader is responsible.

Tactile Periodic Table of Elements (continuing)

Purpose: To develop a tactile Periodic Table of Elements appropriate for blind and visually impaired students in elementary, middle school, high school, and college

Project staff: Karen J. Poppe, Project Leader
Kristopher A. Scott, Project Assistant
Tom Poppe, Pattern and Model Maker

Background. The need for a tactile Periodic Table of Elements was recognized by the project leader via direct requests for such an educational device by teachers of the visually impaired as well as through shared teacher recommendations on listserves. APH has the expertise and means to create a tactile Periodic Table that saves teachers' time and allows visually impaired students to become knowledgeable regarding important features of elements, such as their atomic numbers, atomic symbols, atomic weights, and electron configurations.

In June 2000, the project leader presented the product idea to APH's Product Review Committee, giving specific examples of requests from the field. The committee supported the development of the product described as two accessible renditions of the Periodic Table of Elements--one that will serve as a tactile reference sheet and a second that will be interactive in design, allowing students to sequence and group the elements. Braille and print study cards containing basic information about each element are also planned.

Work during FY 2001. As time allowed, the project staff continued to research, purchase, and review other commercially available Periodic Tables. This project did not transition to the active timeline due to higher-priority projects that the staff was involved in throughout the year.

Work planned for FY 2002. Given continued requests for a tactile Periodic Table of Elements evidenced in the results of recent product surveys, the project staff will strive to begin active development on this project in the coming year.

Tactile Graphics

Basic Science Tactile Graphics (continuing)

Purpose: To produce a set of vacuumformed tactile graphics depicting science concepts commonly covered in grades 4-6, along with a teacher's guidebook giving suggested uses of the graphics

Project staff: Fred Otto, Project Leader
Frank Hayden, Production Assistant
Tom Poppe, Pattern and Model Maker

Background. Because of special monies allotted for the purpose, and with the recommendation of the Research and Development Committee, it was decided to produce materials in the area of science. A demand for science education has been expressed in the national education goals and by the major consumer groups in the field of blindness and visual impairment. This project and others underway related to science also help address a relative lack of APH materials in this content area.

Textbooks for grades 4-6 contain many illustrations that can be turned into meaningful tactile graphics. Since much of the material covered in grade 4 is revisited in grades 5 and 6, it was agreed that a set of well-designed graphics would be useful at any of these grade levels.

Work during FY 2001. The project leader refined the graphics for the set based on early prototypes. Problems with the automated router in Production again delayed the creation of prototypes until it was too late for spring field testing; evaluation is now being conducted in the fall of the 2001 school year.

Work planned for FY 2002. When field testing is complete, revisions will be made. A final set of graphics, cover artwork, guidebook, and specifications will be turned over to Technical Research to complete the project.

Quick-Draw Paper (formerly Instant Tactile Art Paper) (Completed)

Purpose: To provide a unique paper to the visually impaired and blind population that allows instantaneous graphics useful for a wide variety of art, orientation and mobility, and other educational activities

Project staff: Fred Otto, Project Co-Leader
Karen Poppe, Project Co-Leader
Sarah Ballard, Project Assistant

Background. While researching types of textured papers for the *Picture Maker: Wheatley Tactile Diagramming Kit*, Karen Poppe found a special type of compressed sponge paper. The project staff concluded that this "pop-up" sponge paper, manufactured for decades for other purposes, held special possibilities for tactile graphics applications. Given the fact that the paper could expand to a thickness of 5/8" when immersed in water, it followed that a water-based tool of any kind, such as an inexpensive highlighter marker, a wet paintbrush, or a cotton swab, could be used to "draw" on the paper for an instant tactile, as well as colorful result.

For many years, students with visual impairment and blindness have had little opportunity to create their own artwork, to doodle like sighted peers, and to produce "masterpieces" to hang on the refrigerator or share with peers. This sponge paper provides a medium for such activities, and can also be used by teachers, parents, and sighted peers needing to quickly and conveniently render a simple map, show the shape of a printed letter, engage a student in art activities common to any classroom, and more.

The project leaders developed an evaluation form for parents and teachers of visually impaired students to provide input about the sponge paper's value for their students or children.

In November of 1999, the survey was mailed to 16 field test sites. The field test results were compiled and reviewed by the project staff. Evaluators representing the states of New York, Kentucky, Georgia, Oregon, Ohio, Alaska, Florida, Texas, North Dakota, Illinois, Tennessee, California, Missouri, Utah, and Washington used the paper with 28 visually impaired and blind students, ages 3-17 years old.

Evaluators were very enthusiastic and confirmed the paper's unique qualities and applications. The paper was described as allowing instant tactile feedback, as allowing blind and visually impaired students to participate in art activities, as easy and fun to use, and as portable and light-weight; the fact that both sides of the paper could be used without compromising the quality of the tactile image was also noted. In general, the sponge paper proved to be very versatile, accommodating a variety of activities including simple map production, drawing/scribbling/tracing tasks, handwriting/signature practice, graphs and pie chart creations, "spur-of-the-moment" science diagrams, and so forth.

In May of 2000, this product was presented to the Research and Development Advisory Committee for possible quota approval; quota approval was received.

Work during FY 2001. The project leaders prepared the text for the product's accompanying documentation, incorporating many of the suggestions garnered from field reviewers. Cover art, product specifications, and braille translation were completed in November 2000. The first production run of *Quick-Draw Paper* was completed and made available in January 2001. The final product consisted of 10 sheets of compressed sponge paper (approximately 8.5 x 11 inches), a "Suggested Activities" pamphlet in Braille and large print, and two water-based drawing tools appropriate for use with the paper. Post-production activities included (a) preparing brochure information, (b) demonstrating its use at conferences and workshops, and (c) reviewing product sales and requests from the field for additional sizes, colors, and number of sheets. The first-year's sales proved the product remarkably popular, re-affirming the product's unique application for students with visual impairments and blindness.

Work planned for FY 2002. The product is officially complete, however the project leaders will continue to monitor future production runs, demonstrate the product at tactile graphics workshops, and investigate the need for "bulk" packages based upon customers' requests.

Stationary Tactile/Print Ruler (new)

Purpose: To develop a tactile/print ruler that will allow young students with visual impairments and blindness to more easily and accurately measure embossed or thermoformed lines or figures

Project staff: Karen J. Poppe, Project Leader
Tom Poppe, Pattern and Model Maker

Background. While conducting a tactile graphics workshop at the Arkansas School for the Blind in April 2001, the project leader was told of the difficulty that some young students have when trying to position and hold a ruler in place as they attempt to accurately measure a raised line or figure. Not having an immediate solution to the problem, the project leader gave it more thought after returning from her trip and had the idea of providing a flexible magnetic sheet along with a metal ruler; the magnetic sheet could be placed under an embossed or thermoformed page with the metal ruler securely positioned along side the raised line or figure. An additional idea of a non-skid material affixed to the underside of an existing ruler was suggested by the Director of Research.

Work during FY 2001. The project leader worked with the Model/Pattern Maker to create the two proposed "stationary" ruler designs. In May 2001, the mock-ups were sent to two teachers at the Arkansas School for the Blind to use and evaluate; their reviews were very positive, especially with regard to the magnetic version because it worked so well on thermoformed pages. One teacher wrote: "We had tried so many things and you were able to come up with such a great idea in such a short time."

Given the teachers positive feedback, the project leader presented the idea to the Product Review Committee. In June, the committee gave approval to proceed with the development of the two "non-skid" rulers.

Work planned for FY 2002. The project will transition from "holding cell" status to the active time line. Two "stationary" tactile rulers will be developed: one ruler will be stamped from steel (or thermoformed in plastic with a steel underplate adhered) and accompanied by a flexible magnetic sheet that can be placed under the page with the raised line/figure. A second ruler will be created from thermoformed plastic with braille/print markings and have a thin non-skid rubber backing adhered that will prevent slippage of the ruler especially on paper surfaces.

Stencil Embossing Kit (Completed)

Purpose: To provide a kit that allows teachers, parents, and siblings to create quick, inexpensive, multi-textured raised-line images using a popular and easily mastered stencil embossing technique

Project staff: Jan Carroll, Project Co-Leader/Product Developer
Karen J. Poppe, Project Co-Leader
Sarah Ballard, Research Assistant
Tom Poppe, Pattern and Model Maker
Frank Hayden, Project Assistant/Technical Research

Background. The stencil embossing kit is based upon the collection of items demonstrated in recent years at workshops and conferences across the country which were identified by the project developer as useful for creating tactile graphic displays. The kit offers everyone, from the very experienced tactile artist to the novice transcriber, a handy option for generating embossed pictures for blind students and adults. The assortment of embossing tools and stencil shapes facilitates the creation of individually designed tactile graphics for a variety of purposes such as O&M instruction, classroom activities, greeting card and homemade book creations, and so forth. Apart from expanding the palette of available tactile graphic tools, the kit provides Mini-Lite owners with another application for their portable light source other than vision training. The kit is best used with an illuminated surface (either an APH light box or self-made lighted backdrop) to align, arrange, and plot tactile shapes, braille labels, areal patterns, etc.

The project transitioned from Goal 0 status to the active timeline in December 1999. The project leaders met with the Product Development Committee to familiarize members with the purpose, format, and components of the kit; a realistic schedule and pilot run/production run quantities were determined. The product was also presented to the Accessibilities Committee to garner their feedback regarding appropriate and accessible media for the guidebook.

The project staff met several times to determine items requiring original, in-house tooling (e.g., braille signage stencils and point symbol stencils) and those commercially obtainable (e.g., brass stencils, fiberglass screen wire, and tracing wheels). The content and presentation of the guidebook, as well as an ideal carrying/housing container was also discussed.

With the "look" and components of the prototype kit determined, multiple sets were assembled for field testing purposes. The content of the field test kit consisted of the following items: standard and jumbo braille signage stencils, soft screen wire, needlepoint canvas, a laminated grid, a sheet of packing foam, a clear flexible vinyl sheet, "Light Box" stencils, seven brass stencils, a signature guide stencil, a letter-writing guide stencil, a "Foamie" sheet, a braille eraser, two embossing styluses, a tracing wheel, a print guidebook, a pencil case to hold the smaller items, and a large carrying case to house all of the components.

A thorough evaluation packet was prepared and sent with complete kits to 12 field test sites in February 2000. Participating reviewers included teachers and transcribers representing a variety of educational settings, tactile graphic experience, and prior familiarity with the kit. All of the evaluators had access to an APH Light Box or Mini-Lite. The reviewers evaluative remarks about the usefulness of the kit were positive; one evaluator summed it up by stating that the kit was "a very low-tech piece of equipment but *most* beneficial to those of us in the field."

Based on field test results, a number of changes were planned for the kit. Notable changes included the omission of some brass stencils, the elimination of the slate and stylus, the addition of thermoformed samples patterned after the tactile creations submitted by reviewers, a larger braille signage stencil, and the provision of a more spacious and durable container. The Name Committee also redefined the "Stencil Embossing Kit" as the "Crafty Graphics: Stencil Embossing Kit."

Work during FY 2001. Product specifications were finalized, the tooling for the accompanying guidebook and original items (e.g., braille signage stencils) were prepared, cover art for the outside container was readied, and the pilot run and initial production run were completed on schedule in June 2001.

Worked planned for FY 2002. The project is officially complete, but the project leaders will continue to develop additional stencil packages (e.g., U.S. State outlines) that will extend the possible applications of the initial kit. The product will continue to be demonstrated at future workshops and conferences, and customer feedback will continue to be garnered and reviewed.

Tactile Graphics Kit Re-Design (new)

Purpose: To re-design the existing APH Tactile Graphics Kit to reduce its cost, improve its line-drawing tools, and to update its overall appearance and packaging

Project staff: Karen J. Poppe, Co-Project Leader
Tom Poppe, Co-Project Leader/Model & Pattern Maker
Kristopher A. Scott, Project Assistant

Background. The Tactile Graphics Kit was developed in the early 1980's by John Barth, a former APH researcher. The kit was designed to provide transcribers, teachers, and O&M specialists a means for constructing tactile graphics on an individual basis using a heavy gauge aluminum foil master. The kit, which includes a variety of line-drawing tools, areal patterns, and point symbol tongs, is accompanied by a manual that 1) introduces the proper use of the kit's tools and materials; 2) provides information for designing and constructing legible tactile graphics; and 3) offers information on training blind students to read tactile maps.

The Tactile Graphics Kit continues to be purchased and used today by those creating tactile graphic displays for students with visual impairments and blindness. Based upon extensive and well-documented research, the kit's components can be used to produce the types of lines, point symbols, and areal patterns encountered in most APH textbooks as prepared on the Plate-Embossing Apparatus for Raised Lines (PEARL) machine.

Work during FY 2001. After thoroughly reviewing the current cost of producing the line-drawing tools, the carrying case, and other components included in the Tactile Graphics Kit, the project staff outlined their recommended updates and revisions and reported these to the Product Review Committee (PRC) in May 2001. The project leaders' suggested revisions were supported by a survey conducted of experienced transcribers; the respondents also acknowledged that certain items needed improving or omitting. The PRC approved the re-design of this product.

In August, the project leaders conducted a Product Development Committee meeting to discuss expected updates/changes with other in-house departments. Changes planned include 1) changing the wooden tool rack to a vinyl tool pouch; 2) changing the aluminum line-drawing tools to a durable, less costly Delrin® material; 3) eliminating the paraffin; 4) omitting the pantograph; 5) making editorial and aesthetic changes to the guidebook; and 6) making the outer carrying case less expensive, more portable, and more attractive. Prototypes of the new line-drawing tools and the vinyl pouch, designed by the Pattern Maker, were shown as examples of expected revisions. A feasible schedule was developed by the committee taking into consideration the remaining inventory of the original kit. The product then advanced to the active time line.

Work planned for FY 2002. Prototypes of the new Delrin line-drawing tools will be field tested by very experienced tactile graphic designers who are long-time users of the *Tactile Graphics Kit*. The reviewers' opinions regarding other planned modifications will be garnered as well. Based upon the data collected, the project staff will proceed as quickly as possible to implement the design changes. The updated product is planned for availability by the end of the first quarter of the fiscal year.

Tactile Graphics Research (continuing)

Purpose: To study and develop techniques for making useful tactile graphics, to work toward standards in tactile graphic presentations, and to evaluate product submissions and ideas from the field related to tactile graphics.

Project Staff: Fred Otto, Project Co-Director
Karen Poppe, Project Co-Director
Tom Poppe, Project Assistant

Background: APH has a variety of means for producing tactile graphics, including embossed paper, puff ink, capsule paper, and vacuumform. One goal of research is to learn which media are appropriate for which uses and what the costs are of each.

In addition, tactile graphics products are frequently submitted by teachers or other professionals who would like to collaborate with APH in producing their materials. Some of these are well-researched and well-crafted; all merit thorough consideration. Another aspect of research is to monitor developments in practice, technology, and philosophy as they evolve.

Work done during FY 2001. Fred Otto purchased several volumes of world geography from the Princeton Braillists to evaluate their methods and to consider as possible APH product additions.

Project leaders met several times with Accessible Textbook Initiative (ATIC) and Technical Research staff to discuss how the Tactile Visions process for making tactile graphics may be used for ATIC production. The project staff generated a variety of lines, point symbols, and areal patterns and reviewed them with other APH staff for their legibility. It was concluded that a new palette of tactile symbols needed to be developed specifically for use with the Tactile Vision process and tested with students; the symbols currently used on PEARL-generated graphics do not necessarily translate into discriminable lines, symbols, or fill-patterns when utilized with this new tactile process.

Project staff, along with many others, devoted time to evaluating materials from Howard Vreeland for teaching students to recognize pictures of 3-dimensional objects in oblique positions through touch.

Karen Poppe purchased and evaluated three different tactile drawing boards which employ sheets of plastic film and rubber pads for making instant raised diagrams. Preliminary investigation of other types of film for this same purpose was conducted.

Karen Poppe conducted a nationwide Tactile Graphics Survey [see separate report] of teachers of visually impaired and blind students.

Karen Poppe also presented new product ideas that were approved by the Product Review Committee including a tactile game board, a sequel to Tactile Treasures (tentatively name Tactile

Transitions), a Stationary Tactile Ruler [see separate report], and a Graphing Kit intended for children in grades K-3 to create bar graphs, pie charts, etc.

Throughout the year, project staff also conducted tactile graphic workshops and demonstrated the use of new tactile graphic products at vision conferences.

Work planned for FY 2002. These efforts will continue, especially as they relate to the area of helping those who make and teach tactile graphics. As APH incorporates new graphics production processes in the Accessible Textbook project, project staff will be available to help train transcribers in appropriate design practices.

The project staff also plan to host a Tactile Graphics focus group to prioritize tactile graphic product ideas and research activities.

Tactile Graphics Survey (new and completed)

Purpose: To conduct a national survey of teachers of the visually impaired to identify product needs in the area of tactile graphics

Project staff: Karen J. Poppe, Project Leader
Kristopher A. Scott, Project Assistant

Background. The project leader continuously gathers product ideas related to area of tactile graphics from a variety of sources, including conference and workshop attendees, in-house focus groups, advisory committees, product consultants, field test evaluators, and students. To capture product ideas from a greater number of teachers in the field, the project leader decided to create a brief survey allowing those "in the trenches" to indicate the tactile products that they currently use with their students and to list the types of tactile products that are still needed.

Work during FY 2001. In March 2001, the project leader prepared the Tactile Graphics Survey and mailed copies to all Ex Officio Trustees to disseminate in their respective states. The survey was also mailed to 100 teachers of the visually impaired located on the existing Field Test Evaluator Database [see separate report] who indicated an interest in evaluating tactile graphics products. Additional copies were available at APH workshops and product display booths.

The project assistant entered the data from 276 returned surveys using an MicroSoft Access database. Preliminary results were shared with the Research & Development and Publications Committees at the Interim Meeting in April 2001. The findings indicated a need for a variety of tactile graphics products that were later categorized by the project staff according to the following areas: Math, Science, Maps, Assessment, English/Literature/Writing, and Miscellaneous. Below are some of the respondents' suggestions as grouped under each heading:

Math: tactile graph paper with larger margins; a graphing tactile calculator; geometry practice sheets
Science: more *Sense of Science* kits; biology atlas; tactile and talking globe
Maps: a teaching guide for tactile maps; single-state map availability; an extensive atlas
Assessment: guides to assist students in interpreting the types of tactile diagrams encountered on tests
English/Literature/Writing: preschool storybooks; handwriting guides
Miscellaneous: more *Tactile Treasures* worksheets; more pre-braille products

Many of the tactile products requested were ones that APH currently has available, such as tactile stickers, a smaller Chang Kit [i.e., *Picture Maker*], and tactile storybooks—or, is in the process of developing (e.g., tactile science kits).

Work planned for FY 2002. The project leader will continue to use the results of the survey to identify needed educational products in the area of tactile graphics. The survey results

will also be reviewed by a Tactile Graphics focus group that the project leader will facilitate at APH by the end of the year.

The project leader foresees no "End" to garnering tactile graphic product ideas from the field. Listening to the needs of teachers who work directly with visually impaired and blind students is our "compass" for determining appropriate materials.

Tactile Stickers (Completed)

Purpose: To provide a "toolbox" of various tactile, adhesive stickers and textured sheets that can be used by teachers, family members, and blind or visually impaired students and adults for a myriad of purposes, from creating simple tactile graphics and student worksheets to labeling personal belongings and dangerous household materials

Project staff: Karen Poppe, Project Leader
Sarah Ballard, Project Assistant
Tom Poppe, Pattern and Model Maker

Background. Given the positive reaction to the concept of a tactile sticker package, as expressed by 50 teachers of the visually impaired, the Project Leader presented this product idea to APH's Product Review and Executive Committees. Company support regarding development of this product was received from both committees.

Respondents to the "product idea survey" proposed uses of tactile stickers which included the following: incentives/rewards for grading papers; building discrimination skills; labeling and organizing belongings; creating patterning/sequencing activities; adapting commercial keyboards; preparing and representing bar graphs and pie charts; making simple maps; marking angles and other geometric figures; marking errors on students' papers; labeling books and folders; illustrating spatial concepts; and labeling dangerous household containers.

The Project Leader, with the assistance of the Pattern/Model Maker, began constructing appropriate tactile sticker packages to address the many applications suggested by survey respondents. Planned components included adhesive vinyl styrene sheets of various bright colors that are embossed with a selection of tactually discriminable point symbols. Adhesive sheets of interesting areal patterns and textures from which shapes of various sizes can be cut, braille alphabet letters, raised line smiley and frowny faces, and large type/braille reward statements will be included.

The project transitioned from the Goal Zero stage to an active development in FY 2000. The contents of each sticker package were firmly defined and samples of each were produced for evaluative purposes. The project staff designed the layout of each tactile sheet, determined the quantity and size of each type of sticker, and worked with two outside vendors to obtain colorful adhesive papers and to kiss-cut the pieces for easy removal and application. The field test prototype "collection" of stickers consisted of four clear sheets of alphabet stickers (a total of 676 stickers); five sheets of point symbols in assorted colors (a total of 1,040 stickers); four sheets of reward statements in two colors (a total of 200 stickers); and four sheets of smiley/frowny face stickers in assorted colors (192 stickers total). Multiple sets were silkscreened and kiss-cut, entailing a combination of in-house and outside vendor manufacturing processes. [Adhesive areal pattern sheets were not produced because of a separate project incorporating Tactile Colour Communication adhesive papers. Original patterns, produced by APH, might be explored later.] A "Suggested Uses" sheet was composed based upon possible

applications compiled from a related survey of parents and teachers of the visually impaired. An extensive evaluation packet, allowing reviewers to judge each individual packet of stickers, as well as their overall appearance, embossed and print quality, adhesion to a variety of surfaces, and usefulness was developed.

Twenty-one sets of stickers were mailed to evaluators from the states of Texas (2), Nebraska, New Mexico, Connecticut, Indiana, Ohio (2), Arkansas, Kentucky (2), Maryland, Oregon, Georgia, Illinois, Virginia, Utah, Minnesota, Colorado, New York, and Wisconsin. Additionally, smiley-face stickers were supplied to the Washington Talking Book and Braille Library where they were used as rewards in the reading logs of braille readers. Field evaluation was completed in April 2000. The majority of the evaluators suggested that the tactile sticker packages be made available from APH as a comprehensive set, as well as separately. The evaluators were pleased with the stickers' embossed quality, visual appearance, transparent colors, ease of use, usefulness, and adhesion to a variety of surfaces. The evaluators used the stickers in the following creative ways: *Point symbol stickers* were used to label social studies maps, clocks, gameboards, microwaves, TV remotes, washers and dryers, floppy disks, calculator keys, computer and piano keyboards, "items around the house," etc. The smiley and frowny faces were used to mark incentive charts for completing assignments, grading papers, labeling game cards (smiles go "forward," frowns go "backward"), to decorate homemade cards, to reward good behavior, and to mark attendance charts (frowny face indicated "not here"). The reward statement stickers were used primarily to grade papers and to reward good behaviors, but were also used to promote braille awareness with sighted students and regular education teachers. The *print/braille alphabet stickers* were used to label belongings, grade papers, adapt commercially available keyboards, tactile maps and pictures, to create word games, to label bookshelves, to set up ABC card files, to attach to flat magnets to create phonic manipulatives, to label household items (can goods, cereal boxes), to make alphabet-match cards, etc. As one teacher states, "These stickers have hundreds of uses. . .we've put them everywhere. . .and the students enjoy them."

In May 2000, the Project Leader convened the Project Review Committee and determined revisions based upon field test results. Minimal changes were needed including 1) an additional red sheet to the Point Symbol and Smiley/Frowny Face packages, 2) the substitution of the word "COOL" for the reward statement "NICE;" and 3) the omission of the triangular point symbol; more arrows and simple dots were added instead. The evaluators unanimously wanted an "Assorted Package" as well as individual packages of each sticker type. Quota approval for the five separate packages of the "Feel 'n Peel Stickers" was received from the Research and Development Committee at the May 2000 Advisory Committee Meeting.

In June, the Project Leader provided a mock-up of the accompanying documentation to the in-house Graphic Designer, who prepared the final artwork for the "Suggested Uses" insert. In July, the Model Maker made needed changes to the embossing plates and the documentation was transcribed into braille. Given the lengthy lead times for embossing, kiss-cutting, and packaging processes, the pilot run was scheduled for January 2001.

Work during FY 2001. In January 2001, the pilot and production runs of the five tactile sticker packages were successfully completed on schedule. Post-production activities included (1) preparing promotional materials/brochures; (2) promoting the product at conferences and workshops; (3) generating a final product report; and (4) monitoring additional production runs.

Work planned for FY 2002. This project, as originally planned and outlined in this report, is officially complete. However, given the popularity of the *Feel 'n Peel Stickers*, as evidenced in recent sales figures, the project leader will continue to plan future packages (e.g., braille numbers, large shape stickers, more reward statements, etc.) as recommended and requested by teachers, parents and students in the field.

Tactile Symbol Communication System (continuing)

Purpose: To develop a comprehensive set of tactile symbols that is appropriate for use by visually impaired and blind students who lack a formal means of communicating

Project staff: Karen J. Poppe, Tactile Graphics Project Leader
Tristan Pierce, Multiple Disabilities Project Leader
Kay Jahnel. Project Consultant/Author
Kim Conlin, Project Consultant/Author
Will Armstrong, Project Assistant
Tom Poppe, Pattern/Model Maker
Bernadette Mudd, Graphic Designer

Background. The Tactile Graphics Project Leader became interested in the development of a tactile symbol communication system after attending several workshops at recent vision conferences. After one such workshop conducted at the 1999 Literacy Conference in San Francisco, the project leader had an extended conversation with Kay Jahnel and Joan Pease, both teachers at the Iowa Braille School, who have created a tactile communication system and used it successfully with their students. The teachers proposed that APH host a joint planning meeting with schools that have developed and utilized a tactile symbol system with their nonverbal visually impaired students. This joint meeting was approved and the teachers from the Iowa Braille School were very instrumental in identifying and contacting ideal committee members.

In April 2000, the Tactile Graphics Project Leader served as facilitator of the Tactile Symbol Planning Meeting attended by Kay Jahnel (Iowa Braille School), Joan Pease (Iowa Braille School), Kim Conlin (Texas School for the Blind), Beth Cohen (Maryland School for the Blind), and Jacey Shumaker (Perkins School for the Blind). The purpose of the meeting was 1) to review and compare each school's approach to using tactile symbols; 2) to discuss the desired product outcome; 3) to discuss wider applications relative to IntelliTools adaptations; and 4) to discuss how APH can facilitate the production of a standardized product. Each symbol system was reviewed with regard to categories (e.g., food, emotions, scheduling), symbol structure/design, selection process, appropriate target populations, implementation methods/activities, concrete versus abstract representations, and strengths and limitations. Appropriate target populations were defined by the committee as blind and visually impaired students with multiple disabilities who are nonverbal or lack a formal language system, but have acquired intentional and purposeful communication.

After establishing the purpose and target populations of a standardized tactile communication system, the committee defined the "perfect tactile symbol." A tactile symbol should be tactually distinct, portable and lightweight, durable, high contrast, color coded, safe, predictable, paired with large type and braille labels, and have a Velcro attachment. With those qualities listed, the committee brainstormed possible product options and developed a core vocabulary from which symbols should be created.

A portion of the meeting was dedicated to the demonstration of the use of tactile symbols with the commercially available IntelliKeys keyboard [see separate report for IntelliTactiles: Phase I] and a discussion of needed overlays specifically designed with visually impaired students in mind.

In May 2000, the Tactile Graphics Project Leader received support from APH's Product Review Committee to develop a standardized set of tactile symbols. The components planned include: 1) color-coded, durable mounting boards with Velcro attachments; 2) adhesive braille and large print labels; 3) actual symbols (if safe and readily available); 4) a guidebook explaining the philosophy and implementation/methods/strategies of the tactile symbol system, as well as a pictorial library with assembly instructions for the symbols. The system will reflect a core vocabulary determined by the Tactile Symbol Committee.

Work during FY 2001. In March 2001, the Tactile Symbol Communication System product idea was presented to the Multiple Disabilities Focus Group, a meeting facilitated by Tristan Pierce, APH's new Multiple Disabilities Project Leader. The Tactile Graphics Project Leader created a survey that the members of the focus group could use to evaluate the need for a tactile symbol system. Although the members of the focus group fully supported the development of this product, they encouraged a re-direction toward creating a system that is not standardized, but one that could be personalized for each individual child.

In late July 2001, the project leaders invited Kay Jahnel and Kim Conlin, original members of the Tactile Symbol Planning Committee, to a working meeting intended to discuss the details of the project, assign a variety of project tasks, and plan a time line for prototype development. The two-day meeting resulted in the following outcomes: 1) a core vocabulary was developed and categorized; 2) the shape, color, size, and number of mounting cards were determined; 3) recommended symbols for each tactile card were chosen for inclusion in the pictorial library; 4) six ready-made symbol cards were selected; 4) chapter headings for the guidebook were outlined; 5) a feasible timeline for prototype development was set; 6) a complete list of expected kit components (e.g., braille/large type labels, carrying case, etc.) was created; and 6) consultant agreements were developed.

In August 2001, the project leaders met with the Product Development Committee to familiarize various in-house departments about the expected design of the product and to set dates for the remainder of the time line. Given the complexity of the product, as well the project consultants' available time to write the guidebook, the "Availability" date is slated as March 2004.

The project staff began investigation of available material (e.g., Sintra® or Formica®) with which to build the 200 mounting cards; the cards need to allow consumers to easily and firmly affix real objects or parts of real objects. The project staff chose, based upon recommendations from in-house low vision persons, seven distinguishable colors for the

mounting cards. Preliminary work also included reviewing existing literature and videos about the use of symbol systems with children with multiple disabilities.

Work planned for FY 2002. A complete prototype of the *Tactile Symbol System*, as renamed by project staff, is expected to be ready for field testing by the end of FY2002. Enormous coordination with the project consultants and in-house staff will be required to keep this project on schedule. As much in-house work as possible will be accomplished before receiving the project consultants' final copy of the guidebook content in May 2002; such as activities will include 1) preparing sketches/illustrations for the pictorial library; 2) designing cover art for the guidebook and carrying case; 3) acquiring materials and production tooling to create mounting boards; and 4) locating vendors for items needed for ready-made cards.

Teaching Touch (continuing)

Purpose: To use research on tactile learning in a curriculum for helping young children approach, explore and learn from tactile pictures and graphics

Project staff: Fred Otto, Project Director
Karen Poppe, Project Advisor
Sarah Ballard, Project Assistant
Lois Harrell, Consultant

Background. It is commonly accepted that blind children need specific, intentional instruction in exploring real objects and tactile images to make the connection between things in the larger world and their representations as graphics. There appears, however, to be a lack of materials to help teachers and parents understand this need or carry out this instruction with young children. Tangible Graphs and the Tactile Graphics Guidebook from APH are geared toward students already in school and doing academic work. The guidebook and exercise sheets in this product focus on helping younger children develop skills to read and interpret tactile materials independently.

Work during FY 2001. The project consultant and director wrote a guidebook in three sections: 1) a discussion of the differences and challenges involved in learning with and without usable sight; 2) specific strategies for teaching the tactile learner to explore and compare things actively; and 3) an edited section on teaching map reading from John Barth's *Tactile Graphics Guidebook*. A number of tactile sheets, including tracking exercises, mazes, pattern tracing, and other activities, were also developed in various media. Field evaluation was done in the late summer.

Work planned for FY 2002. APH staff will refine the materials based on comments from the field evaluation. Final design and packaging will be carried out and the product made available for purchase.

U. S. Puzzle Map (Completed)

Purpose: To redesign and make available an enhanced, less expensive version of the original three-dimensional topographical map of the United States for use by blind and visually impaired students and adults

Project staff: Tom Poppe, Project Co-Leader/Pattern and Model Maker
Karen J. Poppe, Project Co-Leader
Kristopher A. Scott, Project Assistant

Background. In recent years, APH has received requests from the field to make available once again the topographical U.S. Puzzle Map that was uniquely beneficial and accessible to blind and visually impaired students and adults, but obsoleted due to costly and labor-intensive manufacturing processes. In 1998, APH's Product Review Committee and Executive Committee approved the reintroduction of the puzzle map. A mere duplication of the original map, however, was neither possible nor desirable; significant changes and extensive re-tooling was needed to update the map. The inclusion and sculpting of new puzzle pieces of Alaska and Hawaii were the most notable adjustments required.

A thorough investigation was conducted by the Pattern and Model Maker to determine if APH's vendor of molded urethane parts could mold and paint the individual states separately. Sample patterns were made and sent to the vendor to mold into urethane parts. Using the sample test parts received, a sawing fixture was designed, built, and successfully tested. The success verified the project leaders' plan to mold the pieces of the map in the manner intended, consequently minimizing necessary in-house painting.

Confident that the revamped manufacturing process would work, the project leaders designed a master sketch of the future puzzle map based upon recommendations from local teachers and an in-house committee made up of low vision and blind individuals. Extensive field testing of the product was determined infeasible due to the amount of tooling, expense, and time required to develop a single prototype.

The development of the new U.S. Puzzle Map advanced from Goal 0 to the active timeline. Tooling to transform and update the "1939 copyrighted" map was begun. Input from local teachers and in-house staff was continually garnered through each step of development and translated into the following enhancements to the map: added state puzzle pieces of Alaska and Hawaii, permanent state markings within the frame itself including incised state boundaries and state abbreviations, a modernized puzzle frame, improved tactile indicators for national and state capitals, removal of major cities to reduce tactile clutter, more visually appealing and contrasting colors, masking overlays for assessment purposes, finger holes for easier removal of states, lighter weight for portability, an accompanying reference guide, and greater affordability. In May 2000, quota approval was received by the Research and Development Committee.

An initial mock-up of the map reflecting the new manufacturing processes and the added physical features emerged in July. This map was shown at summer conferences and received positive and enthusiastic feedback. Satisfied with the outcome of the map's new design, the product specifications for production were outlined and finalized. Meanwhile, project staff prepared a reference guide that detailed the special features of the map, gave facts about the states, and offered a listing of related educational activities. In August, the content of this reference guide was given to the in-house graphic designer for final preparation of cover art and text page layout. The latter part of the year was focused on needed production related tasks (e.g., checking parts received from outside vendor, designing a customized shipping box for the map, etc.).

Concurrent with the development of the new puzzle map, the Model Maker was also given the task of preparing for the National Federation of the Blind a special edition of the map that features a frame with an embossed braille and print dedication to the late Kenneth Jernigan, former President of NFB.

Work during FY 2001. The product specifications for both editions of the U.S. Puzzle Map (APH and NFB) were distributed to Production staff at the end of September 2000. In January 2001, the first forty APH U.S. Puzzle Maps were produced with close and continual monitoring by the project staff. Refinements to the in-house painting, gluing, and packaging procedures were made and reviewed at a pilot run debriefing meeting. Small quantities of both editions of the U.S. Puzzle Maps were produced throughout the spring and early summer until the first planned "production runs" were completed. Post-production activities included the following: 1) continually monitoring future shipments of state boards and frames from the outside vendor; 2) assisting with in-house production when needed (e.g., drilling finger holes); 3) showing the map at local workshops and national conferences; 4) writing a final project report; and 5) assisting with the preparation of brochure/catalog information and product photoshoots.

In May 2001, Tuck Tinsley, President of APH, and the project leaders presented the first three carefully produced versions of the NFB U.S. Puzzle Map to Marc Maurer, President of the National Federation of the Blind, ant to Kenneth Jernigan's wife and daughter. The maps were enthusiastically received and appreciated.

Work planned for FY 2002. Although the initial production runs of both versions of the U.S. Puzzle Map are complete, the project staff will continue to assist Production staff in finding ways to streamline the necessary processes to ensure consistent quality and efficient assembly.

Wheatley Tactile Board (completed)

Purpose: To provide a portable tactile board that can be used by blind or visually impaired students and adults, teachers, and orientation and mobility instructors to illustrate simple maps and diagrams, as well as spatial concepts

Project staff: Karen Poppe, Project Leader
Patty Wheatley, Project Consultant
Sarah Ballard, Research Assistant
Tom Poppe, Pattern and Model Maker
Frank Hayden, Technical Project Assistant/Technical Research
Bernadette Mudd, Cover Art/Graphic Designer

Background. Patty Wheatley, an independent Orientation and Mobility (O&M) Instructor from Lexington, Kentucky, presented a product to APH that she originated and successfully used with visually impaired students and adults for O&M purposes. Over recent years, Ms. Wheatley has personally produced copies of her tactile board upon request for teachers and students wanting to illustrate simple maps, flow charts, diagrams, spatial concepts, etc. The demand for her board, however, increased to a level that she was unable to accommodate. Witnessing the growing popularity and request for her tactile board, Ms. Wheatley turned to APH as a possible manufacturer.

In May of 1999, the Project Leader reviewed the tactile board. Initially, the board appeared to be another rendition of the already available Chang Tactual Diagram Kit. Although it does maintain the same educational objectives as APH's Chang Kit, it also has the added benefits of being smaller in size, more tactilely diverse, colorful, and more recently tested in the field. The Wheatley Tactile Board was presented to APH's Product Review and Executive Committees with a recommendation that the product be produced; both committees supported its development.

On two occasions, the project staff met with the project consultant to become more acquainted with her tactile board and to brainstorm possible materials that would be comparable to the ones she handmade or bought, yet also be attainable for an extended period of time to avoid purchasing problems. The Project Leader and the Pattern/Model Maker researched materials currently used in-house and some that could be easily acquired; an assortment of manipulatives were die cut from the following materials: textured foam, styrene, polyblend, felt, buckram, mirrored vinyl, Dycem, etc. The created "smorgasbord" of sample pieces, shapes, and strips was reviewed by the project consultant.

After a licensing and consulting agreement was signed by Patty Wheatley and APH, the project transitioned from a goal zero status to the active timeline. The project leader continued to work with the consultant to transform the formerly hand-crafted tactile board (made up of many store-bought buttons) into a more refined, colorful, and mass-producible aid. New tactile

pieces such as curves, right-angle strips, and donut shapes were added to the board. A guidebook detailing the board's possible applications was written by the project leader.

An evaluation form was developed and 15 prototypes were created for field test purposes. Each prototype was comprised of 1) a black felt board; 2) over 70 Velcro tactile pieces; 3) an accompanying guidebook in both braille and large type; and 4) a thermoformed image of a cul-de-sac. The last component was included to gauge the need for a tactile image to correspond with each visually depicted layout appearing in the guidebook.

The field evaluation was completed in March 2000. Participating evaluators represented the states of Iowa, Michigan, Texas, New Jersey, Kansas, Washington, Kentucky, Pennsylvania, California, Florida, and Ohio. The board was used with 59 students and adults ranging in age from 3- to 70-years-old. The subjects represented a combination of print readers and braille readers; about half of the subjects were reported as having additional handicapping conditions. The evaluators unanimously agreed that the tactile board should be made available from APH. Noteworthy features mentioned in the results were the board's versatility, tactile diversity, visual contrast, durability, appearance, and portability. Specific changes implemented based upon field test review and the Project Review Committee's suggestions included the following: 1) an increase in the number of tactile pieces included, especially diagramming strips; 2) full-Velcro coverage of tactile pieces; and 3) inclusion of a tactile image for each visually displayed diagram appearing in the guidebook.

The product was formally named "Picture Maker: Wheatley Tactile Diagramming Kit." At the May 2000 Advisory Committee Meeting, Picture Maker was presented to the R&D Committee members for possible quota approval; quota approval was received.

During June 2000, the project leader incorporated needed revisions into the product, identified and located outside vendors for various product components (e.g., rhinestones, craft eyes, fishing lure), finalized content changes to the guidebook, worked with the in-house graphic designer to plan and create needed cover art for both the felt board and the guidebook, worked with the Technical Research Assistant to finalize product specifications for both in-house production purposes and for outside vendors, sketched eight visual layouts (i.e., standard intersection, T-intersection, cul-de-sac, flowchart, art creations, geometry concepts, science concepts, room layout) for the guidebook, worked with the Model/Pattern Maker to create the thermoformed patterns to correspond with the guidebook's visual displays, and determined which items should be offered as replacement parts. In August, project staff monitored the quality of items received from outside vendors, as well as those produced in-house. The pilot run was initiated and completed in September 2000.

Work during FY 2001. The first production run of *Picture Maker* was completed in October 2000 and showcased at APH's Annual Meeting. In honor and appreciation of her product idea, Patty Wheatley was presented with the Virgil Zickel Award, an award by APH to only a select few from the field for their outstanding contributions.

The project leader was involved in a number of post-production activities including: 1)

developing promotional brochures/ads for the product; 2) promoting the product at conferences and workshops; 3) compiling results from an evaluation form included in the guidebook; and 5) giving assistance to the Advisory Services Department in the planning of a product video.

Work planned for FY2002. The *Picture Maker* is complete and available for sale. The project leader will continue to the monitor the sales and future production runs of the *Picture Maker*, showcase the product at conferences and workshops, and address customer requests and questions regarding its function and design.

Tests and Assessments

Brigance ® Diagnostic Comprehensive Inventory of Basic Skills, Revised, ©1999 (CIBS-R) (continuing)

Purpose: To make available a braille version of the latest edition of this well-known and widely-used individually administered assessment tool, useful in developing Individualized Education Plans (IEPs) and placement strategies

Project staff: Barbara W. Henderson, Project Leader
Carol Allman, Ph.D., Project Consultant
Debbie Willis, Project Advisor
Sarah Ballard, Project Assistant
Carol Roderick, Project Assistant
William W. Armstrong, Project Assistant

Background. Because it was identified as an urgent need by the state of Florida, all Ex Officio Trustees were surveyed on the need for Brigance. Twenty-six states responded to the informal survey, the majority of which favored making the revised Brigance Green available in braille. Results also indicated that over 400 students nationwide would be tested with the new Brigance Green each year, if it became available.

Survey results were documented and reported to APH Advisory Committee Members during the Interim Meeting. The project to adapt the revised Brigance was presented to the APH Product Review Committee in late May 2000, and was approved for further development.

In June 2000, an expert consultant was contacted and agreed to work on the project. Copies of the test were sent to the consultant for review. In early July, project staff and the project consultant sketched a plan for the project and discussed timelines via conference call. During the next three months, editing for the student braille edition was completed.

Work during FY 2001. Pre-production markup of print materials was accomplished in November, 2001, and braille translation began in December, 2001, facilitated by the project leader and project assistant. Five of the fourteen student modules were produced and sent to Florida field-test sites in Spring, 2001.

A formal teacher-review of the student modules being field-tested in May, 2001, was very positive. The braille layout, quality of the braille dots and the design of tactile graphics were rated very highly. Students using the Brigance braille materials were especially impressed with the graphs. Minor revisions based upon field test results have been made to the first five student modules. During Spring Advisory Meetings at APH, Brigance® Diagnostic Comprehensive Inventory of Basic Skills, Revised, ©1999, was selected for federal quota approval and the first five modules became available for sale. A projected availability date for the entire inventory was set for late Fall, 2001.

Work planned for FY 2002. The project leader will conduct a follow-up survey on the effectiveness of Brigance for IEP use and to determine how many students were tested in FY

2001 using the new APH materials. In response to any additional feedback from teachers about problems encountered when administering Brigance, revisions will be made.

Cognitive Abilities Scale-Second Edition (CAS-2) (new)

Purpose: To adapt and make available a version of the Cognitive Abilities Scale--Second Edition (CAS-2) appropriate for very young blind and visually impaired children

Project staff: Debbie Willis, Manager of Special Projects
Barbara Henderson, Test and Assessment Project Leader
Judy Parks, Early Childhood Project Leader
Suzette Wright, Research Associate

Background. Dr. Sharon Bradley-Johnson and Dr. Carl Johnson developed the CAS-2 ©2001, available from PRO-ED, which is a norm-referenced measure of intelligence for children from 3 months through 3 years of age. There are two forms of the test; the Infant Form is for children from 3 months through 23 months of age; and the Preschool Form for 24 through 47 months of age. The Infant Form consists of three areas: Exploration of Objects, Communication with Others, and Initiation and Imitation. The Preschool Form consists of five areas: Oral Language, Reading, Mathematics, Handwriting, and Enabling Behaviors.

Three assumptions were used in test development:

1. The test is playful and many engaging toys for young children are used in an effort to maximize willingness to participate.

2. No items are timed as timed items take examiner's attention away from the child and, at this age, do not seem to contribute unique information about children's performance.

3. Items are grouped to ease administration and aid instructional planning.

The test is individually administered. Administration time for the group on whom the original CAS-2 was normed generally varied from 20 to 30 minutes depending upon a child's age and willingness to participate. Results of the CAS-2 can be used to aid in program eligibility decisions as well as for planning individualized instruction.

Work during FY 2001. Drs. Johnson and Johnson wrote a grant proposal to adapt the CAS-2 for use with blind and visually impaired children. After receiving notification that their proposal was awarded funding, they discussed the project with APH Research Department staff. It was decided to meet with Drs. Johnson and Johnson at APH to help determine whether items selected by the Johnsons as problematic for blind and visually impaired children were appropriate and could be presented/tested in a meaningful way. The Johnsons met with Test Central staff and project leaders in the areas of early childhood, low vision, and tactile graphics. In addition, an early childhood and a test consultant were contacted regarding adaptation of the CAS-2. These consultants recommended that APH not make a test available for this age group which would result in a specific intelligence quotient. This was discussed with the Johnsons and

it was determined that the test could appropriately be modified into a test of developmental skills. Each skill area would receive a rating based on a 5-tier scoring system accompanied by recommendations regarding "educational" activities to enhance the child's development. These results could be used for individualized instructional planning and, it is anticipated, would be acceptable for establishing eligibility for various programs. This proposal was taken to APH's Product Review Committee who expressed some interest and some concerns over how the test results would be used, whether the test is really needed in the field, whether the test items would be truly appropriate for the population of very young blind and visually impaired children, and how the test would be normed. In order to get an idea of the need for such a test, a brief survey was developed on which all trustees were asked to rank their need for five select tests, one of which was the CAS-2. Furthermore, Sharon and Carl Johnson were asked to provide APH staff with a complete description of the project plan to adapt and norm the CAS-2 for blind and visually impaired children.

Work planned for FY 2002. The results of the survey of test needs will be compiled and analyzed. Early childhood and test specialists, and other vision specialists, including teachers and test administrators working with multiply disabled children, will be identified and contacted for their input on the plan proposed by Drs. Johnson and Johnson. The survey results, input of various specialists, advice of trustees and APH staff will be utilized to determine APH's degree of involvement in the research, adaptation, and availability of this test. Input from readers of this report is invited.

Kaufman Functional Academic Skills Test (K-FAST) (new)

Purpose: To provide a functional skills assessment in accessible formats, for visually impaired and blind individuals between 15 and 85 years of age

Project staff: Barbara W. Henderson, Project Leader
Debbie Willis, Project Advisor

Background. Information from teachers and service providers has indicated that there is a great need for skills assessments, in accessible formats, for high school students and adults. The K-FAST is being acknowledged as one of the best assessments of its kind, and the Kaufman tests are well-known and respected in assessment circles. Appropriate for testing mastery of real-life skills, a benefit is that K-FAST can be administered in a short session. In addition, the layout of K-FAST lends itself well to adaptation for both large print and braille readers.

Work during FY 2001. A version of K-FAST had already been adapted and produced on a contract basis by APH, with permission of the copyright holder and publisher. Large print, braille, and test administrator's notes were all arranged in a single volume. The Project Leader conferred with braille transcribers and graphic artists to determine the extent of work involved should K-FAST be approved for production as an APH product. Finally, the Project Leader contacted a teacher who had administered K-FAST to several students using the APH materials. Results of the informal review of K-FAST indicated that the APH large print/braille test was 1) easy to use by both teacher and test-taker, 2) very well-formatted, and 3) an accurate measure of functional skills needed for transition to work or college, for a career change, or in general life situations.

Most recently, the K-FAST was included in an APH online survey, where participants were asked to rank the importance of five individualized testing instruments. Results of that survey will be posted and used for purposes of prioritizing future projects.

Work planned for FY 2002. Pending results of the online assessment survey and approval by APH committees for further development, a rework of the existing format of K-FAST will begin in Spring 2002. Project staff and a consultant will be identified. Work will continue from there toward a proposed availability date of Fall, 2002.

Large Print and Braille Disposable Protractor (new)

Purpose: To provide an accurate, inexpensive, disposable, and easy-to-use protractor, with both large print and braille markings, primarily for use by blind and visually impaired students in a testing situation

Project staff: Barbara W. Henderson, Project Leader
Frank Hayden, Project Technical Advisor
Debbie Willis, Project Advisor
Tom Poppe, Model Maker
William W. Armstrong, Project Assistant

Background. Many assessment instruments are produced in braille and large print without the accompanying materials that sighted students get. Blind and visually impaired students taking these tests do not always have appropriately designed protractors provided to them in the testing situation. Sometimes they don't get a protractor at all because protractors aren't included with the tests. A well-designed and yet affordable protractor, provided as part of the assessment tool and available for classroom use before the exam, will optimize testing outcomes. The protractor would be included with tests calling for the use of a protractor, as well as being available as a separate item.

Work during FY 2001. Prior to prototype design, experts in low vision specifications, braille formatting, and design of educational tools were consulted. It was determined that more research into the types of print and/or braille protractors already available was needed. Secondly, an analysis of whether students can successfully use their protractor in a testing situation needs to precede any further work on the project. At such time, the project will move from goal zero to the active time line.

Work planned for FY 2002. Design of the protractor, selection of materials, production of samples, field testing, and documentation of final product specifications will proceed once further research has been done and the project moved to active status.

Large Print and Braille Disposable Ruler (new)

Purpose: To provide an accurate, inexpensive, disposable, and easy-to-use ruler, with both large print and braille markings, primarily for use by blind and visually impaired students in a testing situation

Project staff: Barbara W. Henderson, Project Leader
Debbie Willis, Project Advisor
Frank Hayden, Project Technical Advisor
William W. Armstrong, Project Assistant

Background. Many assessment instruments are produced in braille and large print without the accompanying materials that sighted students get. Blind and visually impaired students taking the tests do not always have appropriately designed rulers provided to them in the testing situation. Sometimes they don't get a ruler at all because rulers aren't included with the tests. A well-designed and yet affordable ruler, provided as part of the assessment tool and available for classroom use before the exam, will optimize testing outcomes. The ruler will be included with mathematics tests which involve measurement tasks.

Work during FY 2001. Prior to the prototype design, experts in low vision specifications, braille formatting, and design of educational tools were consulted. Artwork for the print and braille masters was drawn and reviewed/revised by project staff. Paper and other materials for the prototype were selected and ordered. A precision cutting die was designed, ordered, and received from the vendor.

Selection of the ruler's 7-inch size was based upon two factors: 1) the 7-inch size will fit on regular 8 1/2 by 11 inch paper and materials, lowering the cost of producing the product and 2) the 7-inch size fits handily inside test booklets and on desktops. This size was determined to be sufficient for all measuring tasks encountered in standard large print and braille assessments. Field-test results will provide feedback on ruler size.

To date, all production details have been documented, with prototype production to be completed in Fall, 2001. Twenty-four field-testers have been identified and have agreed to evaluate the ruler.

Work planned for FY 2002. The Project Leader and Project Assistant will categorize results of field-testing, after which revisions to the final design will be made. The rulers will be available both separately and as part of various APH testing products. Evaluation of existing APH products will continue for possible inclusion of the final version of the ruler. Catalog and brochure listings will be written and circulated.

National Literary Braille Competency Test Revised (continuing)

Purpose: To collaborate with the National Library Service for the Blind and Physically Handicapped (NLS) to help formulate and produce a revised competency test that ensures braille teachers meet standard qualifications for knowledge of the literary braille code

Project staff: Eleanor Pester, APH Project Co-Leader
Debbie Willis, APH Project Consultant
Barbara W. Henderson, APH Project Assistant
Mary Lou Stark, NLS Project Co-Leader
Judy Dixon, NLS Project Assistant
Deirdre Knapp, HumRRO Project Consultant
Gordon Waugh, HumRRO Project Consultant

Background. In recent years, concern has been expressed about the amount and quality of braille instruction provided to blind children and adults. In response to this concern, the Committee on Joint Organizational Effort requested that NLS develop a literary braille competency test. Work on this test began in 1989. Administration of the test began in 1994. In 1996, the Human Resources Research Organization (HumRRO) began a validation study of the test, conducting a thorough job analysis and furnishing recommendations for revising the test's content so that it closely matches the current knowledge and skills required of braille teachers. In April of 1998, NLS approached APH with a proposal for a joint effort in revising this test. A meeting was conducted at APH in May 1998 with personnel from HumRRO, NLS, and APH to review the validation process and recommendations.

In July 1998, an agreement between APH and NLS was concluded. APH's goals were maintenance of a test item bank database and production of test-related materials. NLS was responsible for administering the pilot study, identifying proctors, handling the application process, and supervising test administration sites. APH and NLS agreed to be jointly involved in the revision phase of the project. Joint staff identified members of two standing committees: the Administrative Issues Committee and the Test Development Committee.

In 1999, under the direction of HumRRO staff, the Administrative Issues Committee met in January at NLS and in July at APH, and the Test Development Committee met in March at NLS and in June at APH. New test items were developed based on HumRRO's research, and test administration manuals were drafted and reviewed.

In 2000, an in-depth review of test items, the candidate's guide, and the test administrator's manual was conducted by NLS and HumRRO. APH worked with HumRRO on development of a machine scoreable, multiple-choice answer sheet for both print and braille users. A prototype has been used successfully with 10 blind APH employees, and was subsequently incorporated into the pre-test.

Work during FY 2001. Barbara Henderson, APH's new Test and Assessment Project Leader, became involved in this project during FY 2001. NLS rescheduled the timeline with project completion set for 2002. Pre-test materials were produced at APH for phase I, a scoring protocol was developed, and the pre-tests were administered and scored by both NLS and APH personnel, ensuring scoring consistency and test validity. When scoring results are in, feedback from all participants and scorers of the pre-test will be assembled into appropriate revisions. When revisions are complete, materials for the next phase, the pilot test, will be produced by APH.

Work planned for FY 2002. Materials for the Operational Pilot will be produced by APH and the pilot test will be administered in Winter, 2002. All facets, from production, to test procedures, to scoring, will be reviewed by the Test Development and Administrative Issues Committee during meetings at NLS in Spring, 2002. APH project personnel will also attend these meetings. The final version of all test materials will be prepared by NLS and APH, and the final report will be written by HumRRO. The final revision of the National Literary Braille Competency Test is expected to be available for administration across the country in early 2003.

Psychoeducational Assessment of Students Who Are Visually Impaired or Blind: Infancy Through High School, 3rd Edition (new)

Purpose: To make significant materials available on the assessment of blind and visually impaired students

Project staff: Debbie Willis, Manager of Special Projects
Barbara Henderson, Test and Assessment Project Leader

Background. PRO-ED, Inc. published the first and second editions of *Psychoeducational assessment of students who are visually impaired or blind: Infancy through high school* in 1991 and 1994, respectively. The book includes an overview of assessment; issues in understanding children who are visually impaired or blind; assessment issues and procedures; assessment of infants and toddlers; assessment of preschoolers; assessment of school-age students; and a reference section. From 1994 to 2000, PRO-ED sold 1,481 copies which is below their minimum criterion to continue publishing the book; therefore, publication of the book was discontinued. PRO-ED very generously returned copyright to Dr. Sharon Bradley-Johnson in order to pursue publication elsewhere.

The third edition will be co-authored by Sharon Bradley-Johnson and a colleague in Central Michigan University's Psychology Department, Dr. Sandra Morgan. Dr. Johnson and Dr. Morgan have worked together on several projects involving students who are visually impaired or blind. Plans for changes to the third edition include: updating the test reviews with new editions of the tests, adding a description of the procedure and technical adequacy for curriculum-based measurement with braille readers, expanding the section on family issues, adding a section on considering sleep problems as part of the assessment process, adding a discussion of teacher concerns when students with severe visual losses are placed in the regular classroom setting, and adding a table describing test options for each area. The book will be directed to teachers of blind and visually impaired students, school psychologists, and educational consultants.

Work during FY 2001. Dr. Sharon Bradley-Johnson sent a copy of the second edition of the book under discussion along with a cover letter to Test Central staff. The book was presented to APH's Product Review Committee for consideration as an APH product. The question of whether to publish the new edition of this popular and well respected book was tabled until APH's Product Advisory Team (P.A.T.) could meet and determine whether APH should, in fact, publish books. It was decided that if publication of a book helped achieve specific project goals, then the book could be considered for publication by APH. In light of the P.A.T. decision, the book was presented a second time and approval to move forward with the project and publish the book was received.

Dr. Sharon Bradley-Johnson was informed of the decision and a list of considerations for the contractual agreement were developed and discussed. The contractual agreement will be finalized and project staff will request that this project be released to the "active" timeline.

Work planned for FY 2002. Dr. Bradley-Johnson and Dr. Morgan will submit a near final draft to APH project staff by January 2002. In winter 2002, the book will be reviewed by six consultants. In spring 2002, necessary changes will be outlined and completed by the authors, after which the book will be edited by a professional editor. APH staff will format the information for presentation in various media, create the necessary artwork and production specifications/documentation, and the book will be scheduled for production and availability.

Test Access: Guidelines for Computer Administered Testing (continuing)

Purpose: To develop guidelines for computer administration of tests and assessments to students/clients who are blind and visually impaired

Project staff: Barbara W. Henderson, Project Leader
Larry Skutchan, Project Advisor
Debbie Willis, Project Advisor
James M. Allan, Lead Project Consultant
Nanette Bulla, Project Consultant
Steven A.Goodman, Project Consultant, representing California School for the Blind
Kristopher A. Scott, Project Assistant
William W. Armstrong, Project Assistant

Background. Because it identified an important educational trend, this project was a specially funded initiative for FY1999. Each year, more and more school systems will deliver their assessments via computer. If we are to ensure that students with visual disabilities are not excluded from educational experiences, it is crucial to develop and provide the field with a set of guidelines for computer-based testing.

Initial work during FY1999 consisted of initiating an investigation of the status of computer-based testing of students in school systems nationwide. A new Test and Assessment Project Leader joined the Department of Educational Research in January 2000. The Project Leader contacted test publishers and reviewed demonstration software for accessibility, subsequently meeting with the Project Advisors to discuss problems with commercially available software and the possible applicability of *Teacher's Pet* to this project. An outline of sections and a tentative timeline for the project were drafted.

Three expert consultants in the areas of technology, blindness, and low vision were contacted and agreed to join the Project Team. Consulting agreements were signed and each team member was assigned their sections of the guidebook to draft. The lead consultant drafted portions of the manual while continuing to test web sites and commercially available software for accessibility. During the APH 2000 Annual Meeting, the Project Leader and Lead Project Consultant met for a project update. The Project Leader and project staff met at Texas School for the Blind and Visually Impaired for a final planning meeting in November of 2000. Rough drafts were received from the consultants between December, 2000 and January, 2001, and were reviewed by project staff.

Project staff were asked by the Kentucky Department of Education to participate in a Computerized Testing Accommodations Workgroup. The Project Advisors and the Project Leader have participated in several meetings of the workgroup. The pilot test, for Kentucky students who will be taking their state assessment tests via computer, is scheduled for 2002.

Work during FY 2001. Technical investigation and drafting of sections of the "Guidelines" continued. An evaluation form was developed, reviewed by the survey committee, and revised as needed. Six professional reviewers, representative of the target audience, were chosen for their expertise in the areas of technology, test design, and testing practices for visually impaired students/clients. The review was made available online in order to provide timely and totally accessible review documents and forms. Final reviews of the document were received in-house by July 31, 2001. Revisions are currently being made.

In connection with this project, the project leader presented a session at the Odyssey 2001: New Frontiers Conference in Vancouver, British Columbia, May 31-June 3, 2001. The session addressed the topic of Computerized Testing Guidelines and was attended by a representative of the Canadian Ministry of Education who was interested in how the U.S. is implementing test accessibility for student with disabilities.

Work planned for FY 2002. Availability of the manual is projected for Winter, 2002. The regular print document will include a diskette with text, HTML, and braille-ready files.

Continuing efforts will track progress on individual states' facilitation of computerized testing. Technology and content updates will be posted on the APH web site in downloadable form. As an adjunct to the published manual, preliminary work on an instructional video is planned for Phase II of the project.

Work planned for FY 2003. Work on the instructional video will continue. The manual will be updated, with new technology reports posted online and accessible formats made available on CDROM.

Test and Assessment Needs (ongoing)

Purpose: To determine the needs of the field with regard to testing and assessing students who are blind or visually impaired

Project staff: Barbara W. Henderson, Project Leader
Debbie Willis, Project Advisor
Monica M. Coffey, Project Assistant
William W. Armstrong, Project Assistant

Background. A Test and Assessment Focus Group meeting was held at APH in July ,1998. Recommendations of the group formed the basis of a survey subsequently sent to school personnel attending an assessment symposium at the California School for the Blind. Results of the survey were documented. Finally, a Test Needs Prioritization meeting was held during the 1999 APH Annual Meeting. In attendance were a select group of experts in the field who refined the information into a list of "most wanted" test titles.

A new Tests and Assessments Project Leader joined the Department of Educational Research in January 2000. Documents and correspondence resulting from work done in 1998 and 1999 were reviewed by the new Project Leader. Internet and library research were done by the Project Leader and Project Assistants on current test titles, copyrights, and relevant web sites.

Established contacts in the field were revisited and new ones made, resulting in the creation of a database of assessment contact persons. The database includes school psychologists, educators, testing coordinators, and test publishers.

Toward forming collaborations and promoting continuing education in the area of testing, a teleconference was sponsored by APH and hosted by the Project Leader. The satellite broadcast, entitled "Psychoeducational Assessment: Critical Issues and Strategies for the Assessment of Students with Severe or Multiple Disabilities," was attended by VI specialists, program coordinators, and psychologists from Kentucky and Indiana.

An informal survey of Ex Officio Trustees was carried out in response to an urgent need expressed by an individual state. That state has mandated that all students be tested using Brigance Green (Complete Inventory of Basic Skills, Revised) in the Spring of 2001. Results of the survey indicated that over 400 students nationwide would be tested using a braille version of Brigance Green when it becomes available.

Work during FY 2001. A virtual (web-based) workshop, "Adapting Currricular Materials for The Inclusive Secondary Classroom," available through the Council On Exceptional Children (CEC), was sponsored by APH and hosted by the project leader. Teachers and administrators from Kentucky School for the Blind and Jefferson County Schools attended. The topic of accessible test materials was addressed in connection with general curricular needs.

New information on availability of Lighthouse International's "Compendium of Instruments for Assessing the Skills and Interests of Individuals with Visual Impairments or Multiple Disabilities," and upcoming APH assessment surveys, was circulated to the field using the APH Advisory Services Newsletter, various listserves, and the APH contact database. A special URL for Assessment Needs Surveys was created and the first of many short surveys was posted online between August 15 and September 1, 2001. Participants in the initial survey were asked to rank five assessment instruments in order of importance for their students/clients: Tactile Boehm-3, Kaufman Functional Academic Skills Test (K-FAST), Woodcock-Johnson-III Complete Battery (WJ-III), Wechsler Individual Achievement Test-Second Edition (WIAT-II), and Cognitive Abilities Scale-Second Edition (CAS-2). Results of these surveys will be posted online and the direct input from the field used to establish priority projects.

APH library holdings of videotaped workshops and training sessions in the area of assessment were increased. The videos and accompanying curricula were shared with teachers and administrators at Kentucky School for the Blind and with ex officio trustees. Additional library holdings of books in the area of assessment were updated.

Finally, the project leader collaborated with the Manager of Special Projects to facilitate the new APH assessment initiative called "Test Central." The initiative seeks to provide information and most promising practices toward ensuring the best testing outcomes nationwide.

Work planned for FY 2002. Contact with publishers on current test titles and future updates will continue. The Project Leader will periodically post short surveys online in order to maintain constant contact with the field. Additional web based and satellite workshops are planned toward the goal of continuing education, professional development, and communication with professionals in the vision field.

Test Central (new)

. Purpose: To ensure that the highest quality tests and assessments are provided in accessible formats to persons who are blind and visually impaired, and to take steps to make certain that these tests and assessments support the goals and rationale of the general education curriculum within states; the general curriculum for students with visual impairments includes the expanded core curriculum specially designed to meet the unique needs of these students

Project staff: Debbie Willis, Manager of Special Projects
Barbara Henderson, Test and Assessment Project Leader
Carol Allman, Consultant
Monica Coffey, Research Assistant
Kris Scott, Research Assistant
Will Armstrong, Research Assistant

Core team: Mary Nelle McLennan, Vice-President of Products and Services
Debbie Willis, Manager of Special Projects
Barbara Henderson, Test and Assessment Project Leader
Rob Wise, Director of Research
Jane Lyons, Director of Accessible Textbooks Initiative and Collaboration (ATIC)

Background. During a brainstorming session on important projects to pursue, an initiative to develop a central location dedicated to developing standardized processes and procedures related to testing was proposed by the Research Department's Manager of Special Projects. Dr. Tinsley presented this initiative to the U.S. Department of Education (DOE) staff who requested additional information.

Work during FY 2001: In February 2001, APH received confirmation from the U.S. Department of Education that Test Central was awarded some startup funding for FY 2001. An early concept of Test Central was presented by the Manager of Special Projects to members of APH's two Advisory Committees during meetings held at APH in April 2001. The Advisory Committees commended APH for the idea of Test Central, recognized the leadership role APH can play with regard to tests and assessments, applauded and strongly encouraged continued efforts in this area. An in-house core team made up of Mary Nelle McLennan, Rob Wise, Jane Lyons, Debbie Willis, and Barbara Henderson was formed and Dr. Carol Allman was recruited as a Test Central consultant. Test Central staff met with ATIC staff who reviewed steps that had been taken by ATIC to get that initiative underway.

Members of Test Central's Core Team met to draft Test Central's strategic goal and vision. The strategic goal was drafted and later modified by Dr. Allman. The primary goal of Test Central is to ensure that the highest quality tests and assessments are provided in accessible

formats to persons who are blind and visually impaired, and to take steps to help make certain that these tests and assessments support the goals and rationale of the general educational curriculum within states. The general curriculum for students with visual impairments includes the expanded core curriculum specially designed to meet the unique needs of these students. Test Central, as defined by its strategic vision, is a test and assessment section of APH's Research Department which effectively responds to the needs of blind and visually impaired individuals by providing appropriately designed test and assessment materials in a variety of accessible media.

Test Central's five tracks include:

1. Education and relationship building;
2. Test adaptation;
3. Adaptation and development of test-related tools and materials;
4. Identification and development of new tests; and
5. Basic research into test related issues.

A committee of in-house staff representing APH's Executive Committee, Educational and Technical Research, Contract Administration, Production, Recording and ATIC, facilitated by Mary Nelle McLennan, were assembled to determine "What must be done to build Test Central." After two sessions of presenting and categorizing over 100 ideas, the results indicated that the following needs to be done in order to build Test Central:

1. Create a master plan.
2. Hire and train staff.
3. Build relationships with test publishers/designers.
4. Develop standards and processes.
5. Maximize test performance through research and communication.

At the third session, this committee, along with other APH personnel, will be assigned to serve as planning team members. The planning team will determine the steps necessary to accomplish each of the five goals listed above and will identify appropriate in-house work teams to help undertake the necessary steps. Accomplishment of these steps will begin to move Test Central into an active and significant role to help address and serve the test needs of blind and visually impaired individuals across the country.

Prior to having the third session mentioned above, Test Central's Core Team met and developed the following immediate four-step action plan:

1. Document all in-house test adaptation processes and procedures.
2. Gather guidelines used in other states and for a variety of tests.
3. Plan a meeting at Annual Meeting to discuss guidelines for test adaptation.
4. Check security issues with test publishers.

Contract Administration staff provided a list of test publishers with whom APH frequently works. These test publishers are beginning to be contacted regarding their security requirements. Organizations such as the National Center on Educational Outcomes at the University of Minnesota are being contacted in order to gather information on state policies and practices on statewide tests as these relate to blind and visually impaired students. Information regarding test accommodations and test adaptations for special populations is being gathered and reviewed. A new Compendium of Instruments for Assessing the Skills and Interests of Individuals with Visual Impairments or Multiple Disabilities ©2001 was published by Lighthouse International. Availability of this new source of test of information was spread to the vision field.

A number of people across the country who are either school psychologists or test coordinators and persons with expertise in either large print, braille, and/or tactile graphics, some of whom have had experience editing tests, were identified and contacted regarding their interest in working on a consultant basis to edit tests into large print and/or braille/tactile formats. Several additional people were identified and contacted regarding their interest in helping to develop guidelines for editing tests into various media. A consultant information form was drafted and revised. After being reviewed and finalized, the form will be used to collect a variety of information on the test-related background of each potential consultant and his or her interest in working on a number of Test Central activities. Activities will include editing, writing supplemental test notes, training test editors, and serving on various Test Central committees. A database will be created and maintained in order to capture and update information on potential consultants.

A "Survey of State Assessment and Accountability Initiatives: Inclusion of Students with Visual Impairments" was drafted by Dr. Carol Allman and reviewed by Test Central staff. The results will be used to identify areas of need that can be addressed nationally on behalf of students with visual impairments. Support for the survey was provided by APH and the National Agenda for the Education of Children and Youths with Visual Impairments: Including Those with Multiple Disabilities. It is anticipated that Dr. Allman will provide preliminary survey results during part of APH's Annual Meeting.

Another survey on "What tests are needed in accessible media?" was drafted and will be circulated to all Ex Officio Trustees. The purpose of this survey is to determine the extent to which adapted tests are needed in various media. It is hoped that all Ex Officio Trustees will provide input to this survey so that Test Central staff will have a picture of the national need with regard to this aspect of Test Central goals. The results of this survey coupled with the results of Dr. Allman's survey will provide some tremendous information for Test Central.

In addition, a joint proposal by Test Central staff and test consultants on "Test-Related Issues, Products and Services for Blind and Visually Impaired Students," was accepted for a two-hour presentation at Nebraska's National Assessment Symposium: For Persons Working with Students who are Blind or Visually Impaired. Test Central staff were present and participated during the test adaptation and accommodations portion of a National Association of State

Directors of Special Education (NASDSE) training session held at APH for educators from around Kentucky. At the "Meeting of the Minds" held at APH, Test Central staff spoke briefly about the goals of Test Central and received some input from participants of the meeting regarding their test needs. Test Central staff along with APH's Technology Project Leader worked with staff from the Kentucky School for the Blind and the Kentucky Department of Education on a pilot project to enable the administration of the Kentucky state assessment via computer to all students in Kentucky.

Test Central staff met with Dr. Terrie Terlau and Fred Gissoni to discuss the need for position statements to be made available from APH. The first of many commonly asked questions, "Is a visually impaired individual allowed to use an abacus in a test-taking situation?" will be studied and a position statement will be drafted. A project to identify, annotate, assemble and distribute a bibliography on test-related research, results, guidelines, practices, policies, products, and organizations was also initiated this year. Test Central staff appreciate the input from numerous sources regarding test needs across the country and how those needs can be translated into Test Central goals.

Work planned for FY 2002. Early in FY 2002, at APH's Annual Meeting, a number of Test Central activities are planned. An overview of Test Central will be provided; a working session of select Annual Meeting attendees will be held to begin developing an outline of considerations to be included in guidelines for editing tests; at a breakout session, some brief presentations relevant to guidelines for developing and editing state assessments will be given by individuals in the vision field as well as Test Central staff, followed by discussion and input from the audience; and all Annual Meeting attendees will be given opportunities to place their ideas, suggestions and comments on Test Central's "Great Wall of Ideas." The framework of guideline considerations will be utilized later in the fiscal year at the first Guidelines Development Committee Meeting. With the assistance of people across the country, as well as APH staff, building Test Central's infrastructure will be underway this fiscal year. An action plan, based on input from the field and steps identified by members of Test Central's core team and planning teams, will be developed. Building relationships with test publishers and developers will be undertaken. An Advisory Committee made up of school psychologists, test personnel, and regular and special educators, will be formed and convened. A committee of students, clients, and their family members will meet to discuss their life and school experiences pertinent to test and assessment issues. A "Most Promising Practices Forum" will be conducted and basic research needs relevant to testing and assessing blind and visually impaired individuals will be identified

Committee members to develop guidelines for editing tests into various media, as well as guidelines for test developers of state assessments, will be identified and come together for one or more working meetings. Developing the necessary standards and processes by which tests will be adapted and produced will be determined and set up. Consultant test editors, as well as in-house test editors, will be sought and trained to edit tests according to the established guidelines. The guidelines will be clarified and expanded as needed. Surveys to gather information will be drafted and distributed; results will be compiled, analyzed, and utilized. Guidelines and information learned through Test Central will be shared with APH staff, Ex

Officio Trustees, blind and visually impaired individuals and their teachers and family members, and other parties involved in test design and development, test administration and scoring, test taking, and educational and career planning personnel.

Other Activities

Field Test Evaluator Database (continuing)

Purpose: To initiate and maintain an up-to-date database of possible field test evaluators

Project staff: Karen J. Poppe, Project Leader
Kristopher A. Scott, Project Leader

Background. In years past, the Educational Research staff relied heavily upon the recommendations of the Research and Development Committee and other Ex Officio Trustees or upon the recommendations of Project Leaders and other APH staff to locate appropriate field reviewers for specific products. Although these sources are still routinely utilized for references, it was decided that the task of finding appropriate and experts in the field would be facilitated by immediate access to a database of interested and qualified reviewers

In July 1998, a "Field Test Evaluator Form" was generated and copies were distributed at the AER International Conference in Atlanta, Georgia; copies were also mailed to Ex Officio Trustees to circulate in their states. Completed forms were returned at a steady and promising rate, materializing into a handy source for contacting interested reviewers. The forms were immediately used to locate all of the reviewers needed for the *Tactile Demonstration Thermometer.*

The Field Test Evaluator Survey was later posted on APH's website, expanding the ways in which experts in the field can express their interest to serve as product reviewers. Returned Field Test Evaluator Surveys were continually monitored and filed. A Microsoft Access database was created and each potential evaluator's information was entered. The structure of the database allows project leaders to locate field reviewers of new materials designed for the blind and visually impaired population based upon the reviewers' areas of interest or expertise (e.g., low vision, braille, tactile graphics, technology, etc.).

The project staff continued to monitor and enhance the existing Field Test Evaluator Database. An acknowledgement letter was sent to respondents to notify them of their presence on the database and to thank them for their willingness to assist with research projects. The database was used to find evaluators for the following products: *Feel 'n Peel Stickers*, *Picture Maker*, *IntelliTactiles*, *Art History for the Blind*, *Let's See*, *Rollbuster II*, *On the Way to Literacy*, and *Quick-Draw Paper* [see separate project reports]

Work during FY 2001. Research Department staff continued to the utilize the Field Test Evaluator Database to locate ideal educational sites to review such projects as *Envision I, Envision II, Punch-Out Ruler*, *Sense of Science: Animals,* and *Rolling Right Along: Rolling Into Place* [see separate project reports]. The database was also used by Karen Poppe to obtain a list of teachers interested in the area of tactile graphics to respond the Tactile Graphics Survey [see separate report] distributed in March 2001.

Periodically, Kris Scott updated the Field Test Evaluator Database form to provide additional "check-off" boxes for other areas of expertise/interest including Spanish, Orientation and Mobility, Social Studies, and Math. To date, nearly 900 teachers and parents of students with visual impairments and blindness have expressed interest in reviewing new products under development.

Work planned for FY 2002. The Field Test Evaluator Database will continue to serve as a handy "pool" from which project leaders can locate possible evaluators of products in all areas of research (e.g., low vision, technology, early childhood). The database will be expanded, updated, and purged of outdated information on a regular basis.

Art History Through Touch and Sound: Survey (new/completed)

Purpose: To determine the overall level of satisfaction with the current art history volumes available and to help determine whether additional volumes of the 22-volume set should be made available in accessible media for blind and visually impaired students

Project staff: Debbie Willis, Manager of Special Projects
Bill Brymer, Resource Services
William Armstrong, Research Assistant

Background. For more than a decade, Art Education for the Blind (AEB) in New York pioneered an effort with numerous artists, museum personnel, vision teachers, visually impaired students and adults, and a variety of consultants to develop an art history series designed for blind and visually impaired individuals. This 22-volume series uses a multisensory system of sight, sound and touch to convey the richness of the world of art to blind and visually impaired students and adults. Two years ago, APH and AEB collaborated to produce and make available three volumes of the series.

Work during FY 2001. A collaborative effort, between AEB and APH, the result of which will be three additional volumes, continued in FY 2001. In order to determine whether volumes in addition to these six are needed, a survey was developed by members of APH's Product Advisory Team and Research Department staff. Surveys were sent to all Ex Officio Trustees and to everyone who by mid-March 2001 had purchased at least one of the art history volumes. The survey was also made available on APH's website; its availability on the website was reported on the survey form and in the monthly Advisory Services newsletter to trustees.

Forty-five completed surveys were returned. Those choosing to fill out the demographic information sheet were from: Washington, Alaska, Kansas, Connecticut, Pennsylvania, New Jersey, Colorado, Texas, Ohio, Maryland, Illinois, Oregon, Mississippi, Iowa, Louisiana, Nebraska, Missouri, California, New York, Florida, Wisconsin, North Carolina, and the Virgin Islands. Vision teachers, administrators of various state agencies, and administrators of schools for the blind were the primary respondents; teachers were the majority of respondents.

Of those responding, 86% were aware of the *Art History Through Touch and Sound* before receiving the survey. When asked to rate their degree of interest in promoting art for blind or visually impaired individuals, 100% of those responding to the question indicated their interest ranged from somewhat to very interested.

Sixty-three percent of the survey respondents had purchased or requested to purchase at least one of the volumes in the series. Of the 37% who had not purchased or requested to purchase any of the volumes in the series, 88% indicated their interest in purchasing volumes of the series ranged from somewhat to very interested.

Thirty-nine percent of the respondents used the product with students in grades 6-8; grades 9-12, 22%; 26% of the respondents used the product with grades 3-5; 4% used it with college aged students; 5% of the respondents used the product with multihandicapped students; 9% of those responding used it with adult learners; 26% of the respondents reported they had personally used the materials. The venue used in presenting art history to the aforementioned groups was mostly in a school setting (42%), while recreation and self-use were both reported by 25% of the respondents.

Ninety percent of the respondents reported that the product met their expectations. Eighty-one percent added that it met their needs; a frequent comment was that the respondents would like the materials to be more appropriate for elementary school children. Ninety-two percent responded they were somewhat to very interested in future volumes of the *Art History* series. Eighty-one percent of the respondents expressed interest in having a print version of the Teacher's supplement. Ninety-one percent of the respondents had not attended a workshop or an in-service on the product. Of that number, 70% believed such training would be beneficial.

Each of the participants had his or her name entered into a drawing to receive the winner's choice of one of the first three volumes of the *Art History* series. The winner Lana Van Horn, of Florissant, Missouri, was selected at random and will receive a review copy of one of the art history volumes.

Results of the survey were provided to APH's Advisory Committees, APH's Product Advisory Team members, and the current project leader, Frank Hayden.

Work Planned for FY 2002. This survey is complete. Results will be utilized to help determine whether additional volumes will be produced and made available from APH and whether some modifications and/or workshops are needed to help improve the use of these materials.

Technical Research Division

Technical Research Division

Purpose: To prepare and introduce new products to APH's production process and to adapt or develop products involving technology

Division staff: Bob Phelps, Manager
Frank Hayden, Manufacturing Specialist
James Robinson, Manufacturing Specialist
Darlene Donhoff, Technical/Clerical Assistant

Work during FY 2001.

Abacus Basic Competency. (New Product) Product will be produced in both Large Type and Braille. Technical Research is working completing product specifications and tooling.. Technical Research worked with the project leader and production people to design a time schedule. Technical Research will work closely with the project leader to monitor the first production run of this product.

Adaptation of Brain Quest: English. (Completed) Technical Research completed product documentation and specifications and turned them over to the production areas.. Technical Research worked with the project leader in getting the parts purchased that go into this product. Technical Research along with the project leader followed the first production run through completion and into stock.

Adaptation of Brain Quest: Geography. (New Product) Technical Research completed product documentation and specifications and turned them over to the production areas. Technical Research is working with the project leader in getting parts ordered which are parts of this product. Technical Research will closely monitor the first production run on the product.

APHont. (Completed) Technical Research completed product specifications and documentation and followed the first production run into stock. Technical Research advised the project leader on the formatting cost of making a CD or a diskette, and going with the least expensive, chose to do a diskette.

Art History Volume 4 - African Art. (Completed) Technical Research developed a time schedule for this product and worked closely with the project leader on setting these goals. Technical Research monitored parts ordered or manufactured in-house to make sure everything was correct and received in a timely fashion. Technical Research followed the completion of volume four into stock.

Art History Volume 5 - Baroque. (New Product) Technical Research is working on product documentation and specifications. Technical Research is now the project leader on these three new art history volumes and will continue to follow these products as was done on the first three. Technical Research is monitoring parts ordered or manufactured in-house to make sure everything is correct and received in a timely fashion.. Technical Research will follow the first production run of this product into stock.

Art History Volume 6 - Greek. (New Product) Technical Research will begin very shortly to develop product documentation and specifications. Technical Research will monitor parts ordered or manufactured in-house to make sure everything is correct and received in a timely fashion. Technical Research will follow the first production run of this product into stock.

Basic Science Tactile Graphics Kit. (New Product) Technical Research will begin working on developing product documentation and specifications. Technical Research converted the project leader's graphic designs into 270 computer drawings. These were then used to generate engraved patterns, which took over 100 individual set-ups on the router, and will be used by the model shop to make vacuum form masters. Technical Research will follow closely with production on the first parts run which will be used as prototype samples for field-testing.

Classroom Calendar Kit: Spanish. (Completed) Technical Research designed the new artwork needed for the Spanish calendar. Technical Research completed and turned over product documentation and specifications to the production areas and monitored the first production run of the product into stock.

Crafty Graphics Stencil-Embossing Kit. (Completed) Technical Research completed and distributed product documentation and specifications and followed the first production run into stock.

Digital Clock Model. (New Product) Technical Research worked with the new vendor to get acceptable samples to be used for field-testing. The samples were received and sent out to various field tests sites by the project leader. Technical Research will complete product documentation and specifications once all field test results have been received and note any revisions to be made. With final approval the first production of the clock model will be received approximately two months.

Envisions I: Vision Enhancement Kit and Curricula for Distance Devices. (New Product) Technical Research is working on completing product specifications and tooling for this product, which has five separate parts. The full kit, print teacher's manual and Braille teacher's manual for students ages 10 years and under, print teacher's manual and Braille teacher's manual for students ages 11 years and over. Technical Research is working with the project leader in developing any tooling needed for the kits. Technical Research will monitor the first production runs of both parts.

Envisions II: Vision Enhancement Kit and Curricula for Near Magnification Devices. (New Product) Technical Research is working on completing product specifications and tooling for this product, which has five separate parts. The full kit, print teacher's manual and Braille teacher's manual for students ages 10 years and under, print teacher's manual and Braille teacher's manual for students ages 11 years and over and also Student Activities Binder for ages 10 years and younger and one for ages 11 years and older. Technical Research is working with the project leader in developing any tooling needed for the production of the kits. Technical Research will monitor the first production runs of both parts.

Feel n' Peel Stickers: Assorted. (Completed) The original name for this product was changed from Tactile Stickers, Symbols, & Braille Letters and has evolved into five individual parts. The five parts will be four individual packets of stickers: Point Symbols, Faces, Reward Statements, Print/Braille Alphabet, and a packet with all the assorted stickers. Technical Research worked with the model shop to produce the prototype samples needed for field-testing. Technical Research developed silk screen art, which was first used for the prototype samples and then used for the production of all the stickers. The stickers were silk-screened and embossed in-house . They were sent outside for the die cutting, collating and packaging.. Technical Research completed product documentation and specifications, and also bills and routings. Technical Research worked closely with the project leader following the first production run into stock.

FoldRite. (Completed) Technical Research worked on designing a prototype made by an outside vendor. Samples were received and approved. Product documentation and specifications were completed and purchasing ordered the first run which went into stock.

German Interpoint Slate [for 4 x 6 cards]. (Completed) Technical Research worked with the project leader to get this product set-up as a pass through product to be available for sale by APH

Individualized Assessment of Visually Efficiency (ISAVE) CD. (Completed) Technical Research wrote an engineering change request to have this added to the full kit once the CD was completed. Technical Research monitored the process of forwarding the CD to customers that had already purchased the ISAVE kit.

Individualized Assessment of Visually Efficiency (ISAVE) Video. (Completed) Technical Research completed product documentation and specifications and worked with the project leader in getting this into stock once it was duplicated and received in-house .

IntelliTactiles: Standard Overlay Companions. (Completed) Technical Research completed production specifications and tooling for this product and worked with the project leader in locating vendors and materials needed to produce the product. Technical Research, along with the project leader monitored the first production run of the product.

Large Puzzle Map of the U.S. (Redesign) Technical Research used the computer-controlled router to make all the engraving for lettering for both APH and NFB versions of the map. Technical Research has completed the bill and routings and product specifications. Technical Research finalized the packaging for the maps and has monitored small runs of the maps done by the production area to complete the first production run for both the APH and NFB versions.

Loving Me Print/CD. (New Product) Technical Research will work on bills and routings and will begin working on product documentation and specifications. Technical Research will work with production and the project leader in following the first production run of the product into stock.

MasterPlan Financial Record Keeper. (New Product) Technical Research has worked with the new project leader in establishing a new timeline schedule and will begin working on product documentation and specifications. Technical Research will work closely with the project leader in getting this product into production and stocked.

MasterPlan Medical Record Keeper. (New Product) Technical Research has completed and turned over to production area, product documentation and specifications. Technical Research will monitor the first production run of the product.

Moving Ahead: Tactile Graphic Storybook--Group A. (New Product) Technical Research will begin working on product specifications once field-testing results have been completed and the project leader determines which book will be the first one to start on. Technical Research is working with the project leader in using the "Atic Tactile Vision Process" to make prototype samples of artwork for field-testing, which may become part of the production process if it is found to be acceptable.

Moving Ahead: Tactile Graphic Storybook--Group B. (New Product) Technical Research has not begun work on product specifications as the project leader is in the early stages of prototype development on this group of books.

Nemeth Code Reference Sheet, Braille. (Completed) Technical Research completed product documentation and specifications and turned them over to the production areas and monitored the first production run of the product into stock.

PICTURE MAKER: Wheatley Tactile Diagramming Kit. (Completed) Technical Research worked with the project leader in determining the final kit content. Technical Research completed all lay out design for 19 cutting dies. All production specifications and documentation were completed by Technical Research. Technical Research monitored the first production run which met the timeline schedule date.

Point of Reference. (New Product) Technical Research is working with the project leader to develop the product and will begin developing product specifications when the prototype designs have been field-tested and the revisions made.

Preschool Activities Calendar, Large Print/Braille. (New Product) Technical Research has begun working on product specifications and documentation. Technical Research worked with the project leader to develop a mini-prototype sample for field-testing. Technical Research will continue working with the project leader to monitor this product through the first production run.

Primary Math Units Kit and Work Sheets. (New Product) Technical Research has began working on product specifications and documentation. Technical Research worked with the project leader to have prototype samples developed for field-testing. The project leader is working on the product in individual units so that field-testing will go more quickly. Technical Research will work with the project leader in developing product specifications as each unit becomes ready for field-testing.

Protocols for the Observation and Recording of Visual Behaviors Kit, Print – Subtitle "What does My Student See?" (New Product) Technical Research is in the early stages of developing product documentation and specifications as this project is in the field-testing and then will need to go through any revisions before finalizing the product materials.

Pumpkin Puzzles. (Completed) Technical Research researched the materials and processes to make this project a feasible product to produce. Technical Research designed the two dies for making the puzzles. Once approval for the materials and process was approved and purchase order was placed and Technical Research monitored and inspected the first production run of the puzzles into stock.

Punch-Out/Disposable Ruler (Large Print/Braille). (New Product) Technical Research worked with the project leader in designing artwork for the new ruler and also in having a die made for die-cutting the rulers. Technical Research will work with the production area to make prototype samples to use for field-testing. Technical Research will complete production documentation and specifications and turn them over to production, once the field test samples have been approved. Technical Research will also help monitor the first production run of the product.

QUICK-DRAW Paper. (Completed) Technical Research completed product specifications and documentation as well as the bills and routings. Technical Research worked with purchasing in ordering the materials to go into this product. This product moved along very well and was completed approximately two months ahead of schedule with Technical Research monitoring the first production run.

Quick Pick Counting. (New Product) This is the fifth kit in the Quick Pick series. Technical Research worked with the project leader in developing prototype samples to send out for field-testing. Technical Research is in the process of developing product documentation and specifications as well as bills and routings. Technical Research will work with production and the project leader to do the first production run once field-testing and the revisions have been completed.

Reach for the Stars - Early Childhood Transition, Braille. (New Product) Technical Research has begun preliminary work on the specifications for the Braille and will work closely with the project leader in the completion of the product documentation. Technical Research is working with the project leader in producing raised line graphics (using the Atic Tactile Vision Process) for prototype samples to use for field-testing.

Rigid Testing Board. (New Product) This is a product that will be used with the ISAVE kit, but will not be part of the kit. It is in the early stages of prototype development and Technical Research has just begun very preliminary product documentation.

RollBuster II. (Completed) This product evolved into two individual parts, one a backpack style, and one a duffel bag style. Technical Research worked with the project leader on designing product documentation and specifications for both styles. Technical Research helped Purchasing in locating a vendor to make these products. Technical Research worked with the project leader to monitor the first production run for each style into stock.

Rolling into Place "Book 1 or the Rolling Right Along Series". (New Product) This product is in very early stages and the project is to get prototype samples made for field-testing. Technical Research will be working closely with the project leader with the development of these prototypes and is helping with researching materials to possibly use for the product. Technical Research will be drawing up product specifications definite decisions on materials are made.

Sense of Science, Animals. (New Product) Technical Research has begun preliminary product documentation and specifications. Technical Research will be working closely with the project leader in developing artwork required for the vacuumform and silkscreen patterns. Technical Research will work with the project leader in monitoring the first production on the product.

Sound Page & Sound Chip. (New Product) Technical Research has worked with the project leader in helping with the design of the sound page and also designed a die for cutting the page out. Technical Research has begun preliminary work on product documentation and specifications on both the sound page and the sound chip.

Teacher's Pet. (New Product) Technical Research completed product documentation and specifications and turned them over to production. Technical Research will work with the project leader in monitoring the first production on the product.

Teaching Touch. (New Product) Technical Research will begin working on preliminary product documentation and specifications on the product. Technical Research will work closely with the project leaders in getting prototypes developed for field-testing.

Termite Torpedo. (New Product) Technical Research has completed product documentation and specifications but has not turned them over to production as of yet. Technical Research will work with the project leader in monitoring the first production run of the product.

TEST ACCESS "Guidelines for Computer Administered Testing of Students Print Kit". (New Product) Technical Research is working with the project leader in developing product documentation and specifications. Technical Research will work with production in getting the first production run completed.

The Littlest Pumpkin. (Completed) Technical Research worked with the project leader and the model shop in designing tooling for the stick-on pumpkins to attach to the pages. Technical Research also worked closely with the Braille transcription department to develop braille plates for the prototypes to be used for field-testing. Technical Research completed product documentation and specifications and turned them over to production. Technical Research turned price quotes on making the individual parts to Purchasing, who placed orders for the parts and received them in-house . All text proofs have been embossed for Braille alignment by Technical Research. Technical Research monitored the first production run of the product into stock.

VIP Suite (Versatile Imaging Processing Suite). (Completed) Technical Research worked with the project leader to get this product set-up as a pass through product and available for sale by APH

Word Associations, Print and Braille Labels. (Completed) This product has five individual parts. They are "Print and Braille labels (Braille edition)," "Print and Braille Labels (Print edition)," "Braille Guidebook, Print Guidebook," and "Labels Only." Technical Research worked with the project leader to complete bills and routings. Technical Research has also completed product specifications and documentation and turned them over to production. Technical Research followed the first production run of the products into stock.

Router Projects. Technical Research continues working with production on using the adapted manufacturing procedures on products cutting them on the automated router. Technical Research continues monitoring products for possibilities of changes to use the automated router. Technical Research is working on solving problems that come up with the new automated router, which has been operational for the production area.

Atic Tactile Visions Process. Technical Research researched feasibility of making quick inexpensive tactile vision graphics. Technical Research next located equipment (the Green Machine and the RISO Copier) for making tactile graphics. Technical Research monitored the installation of the equipment and worked on developing basic standards for the process. This involved determining correct temperatures, speeds, and the correct distribution of the powder for the "Green Machine" as well as selecting the best type of paper to use for making the most acceptable tactile drawings. Technical Research also worked the Atic group to determine the most practical line width in drawings to get the best raised-line graphic. Technical Research is continuing to work with the Atic group and is producing production graphics.

Agencies Participating in Research

In addition to the agencies named here, appreciation is also extended to the many other agencies that cooperated with APH's research efforts by permitting members of their staffs to serve as consultants, reviewers, or respondents to requests for information.

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Presentations and Workshops

Henderson, Barbara W. (2001, February). *Adapting curricular materials for the inclusive secondary classroom*, Council for Exceptional Children (CEC) Virtual Workshop, hosted by the Department of Educational Research for APH Personnel and Teachers of Students with Visual Impairments from Kentucky School for the Blind and Jefferson County Public Schools, Louisville, Kentucky.

Eiland, Mario. (2001, August). *Using scanning and braille translation technology to create handouts for blind and visually impaired children in the Jefferson County Public schools,* Jefferson County Teacher Training Workshop, Louisville, Kentucky.

Henderson, Barbara W. (2001, May). *Update on APH projects in tests and assessments*, Presentation at The Meeting of the Minds, University Personnel Workshop. American Printing House for the Blind, Louisville, Kentucky.

Henderson, Barbara W. (2001, June). *Test access: Guidelines for computer administered testing*, Presentation at Odyssey 2001: Canadian Vision Teacher's Conference, University of British Columbia, Vancouver, British Columbia, Canada.

Kitchel, Elaine. (2001, February). *ISAVE and the child with minimal response topographies.* Louisiana Council for Exceptional Children Super Conference. Baton Rouge, Louisiana.

Kitchel, Elaine. (2001, March). *Lighting strategies for persons with low vision.* Kentucky Teachers of the Visually Impaired Inservice. Louisville, Kentucky.

Kitchel, Elaine. (2001, May). *Making the most of ISAVE.* Odyssey 2001 Conference. Vancouver, Canada.

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Kitchel, Elaine. (2001, July). *Individualized systematic assessment of functional vision.* Nebraska Conference of Deaf/Blind Educators. Lincoln, Nebraska.

Parks, J. (2000, October). *Let's see: Vision development activities for young children.* One Hundred Thirty Second Annual Meeting of the Ex Officio Trustees of the American Printing House for the Blind, Inc., Louisville, Kentucky.

Parks, J., & Hatton, D. (2000, October). *An early childhood registry becomes a reality*! One Hundred Thirty Second Annual Meeting of the Ex Officio Trustees of the American Printing House for the Blind, Inc., Louisville, Kentucky.

Parks, J. (2001, March). *Babies count: The national registry for children with visual impairments, birth to 3 years.* Poster session. 2001 KAER State Conference, Carrolton, Kentucky.

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Parks, J., & Hatton, D. (2001, May). *Babies count project update.* Twenty-first International Preschool Seminar, Seaside, Oregon.

Parks, J. (2001, June). *Babies count: The national registry for children with visual impairments, birth to 3 years.* Michigan Braille Transcribing Fund Meeting for Project Introduction, Ann Arbor, Michigan.

Pester, E. (2000, October). *Basic braille literacy skills.* Annual Meeting of American Printing House for the Blind, Louisville, Kentucky.

Pester, E. (2001, March). *The literacy puzzle: Getting it all together* (Poster Session). Kentucky Association for the Education and Rehabilitation of the Blind and Visually Impaired (KAER) Conference, Butler State Park, Carrolton, Kentucky.

Pester, E. (2001, April). *If johnny can't read braille, why?* California Transcribers and Educators of the Visually Handicapped (CTEVH) Conference, Burlingame, California.

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Poppe, K.J., Poppe, R.T., & Gissoni, F. (2000, October). *Tactile graphic products.* Workshop for teachers of the visually impaired at the Tennessee School for the Blind, Nashville, Tennessee.

Poppe, K.J. (2000, November). *Presentation of Virgil Zickel award to Patty Wheatley.* American Printing House for the Blind, Louisville, Kentucky.

Poppe, K.J. & Poppe, R.T. (2001, April). *Tactile graphic processes and products.* Workshop for teachers of the visually impaired at the Arkansas School for the Blind, Little Rock, Arkansas.

Poppe, K.J. (2001, April). *New tactile graphic products.* Workshop for Peabody students, American Printing House for the Blind, Louisville, Kentucky.

Poppe, K.J. (2001, March). *Tactile products for the classroom.* Poster presentation at the KAER Conference, Carrolton, Kentucky.

Poppe, K.J. (2001, May). *Picture Maker: A tactile diagramming kit.* Odyssey 2001 New Frontiers Conference in Vancouver, British Columbia.

Poppe, K.J., & Poppe, R.T. (2001, May). *Special presentation of NFB edition of the U.S. puzzle map.* National Federation of the Blind, Baltimore, MD.

Poppe, K.J. (2001, May). *Overview of new tactile graphic products available from APH.* "Meeting of the Minds" Focus Group, American Printing House for the Blind, Louisville, Kentucky.

Poppe, K.J., & Abner, G. (2001, June). *IntelliTactiles: Standard overlay companions.* Gateways to Independence Workshop for vision teachers, Kentucky School for the Blind, Louisville, Kentucky.

Skutchan, L., & Creasy, K. (2000, October). *Interactive keyboard training for blind and visually impaired students and adults using Talking Typer for Windows.* Closing the Gap, Miniapolis, Minnesota.

Skutchan, L., & Meredith, R. (2001, January). *Studio Recorder software and the decision process involved in electing to develop custom software for digital audio*, Orlando, Florida.

Skutchan, L., & Creasy, K. (2001, March). *Book Master and the "play room."* Digital Audio Information System (DAISY) Technical Conference, Los Angeles, California.

Skutchan, L., & Lyons, J. (2001, March). *Accessible textbook initiative and collaboration (ATIC) project and its relation to DAISY and Book Master.* California State University at Northridge (CSUN) Conference, Los Angeles, California.

Skutchan, L., & Lyons, J. (2001, April). *ATIC and book master.* Council for Exceptional Children (CEC) conference. Kansas City, Missouri.

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Skutchan, L. (2001, August). *Digital audio components and APH's direction with DAISY.* 2001: A Technology Odyssey, Pittsburg, Pennsylvania.

Skutchan, L. (2001, August). *Interactive keyboard training using talking typer for windows*, 2001: A Technology Odyssey, Pittsburg, Pennsylvania.

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Willis, Debbie. (2001, April). *Test Central: Plans and goals.* Advisory Committee Meetings, American Printing House for the Blind, Louisville, Kentucky.

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New Products

Adaptation of Brain Quest: English Large Type/Braille
APHont: A Font for Low Vision
Art History Vol. 4 "African Art" Diagram Manual
Art History Vol. 4 "African Art" Disk Teacher's Supplement
Art History Vol. 4 "African Art" Kit
Brigance: "Reading Comprehension" Module #04
Brigance: "Word Recognition/Oral Reading" Module #03
Brigance: "Spelling/Writing" Module #07
Brigance: "Reference Skills/Graphs & Maps" Module #08
Brigance: "Math Grade Placement/Numbers" Module #09
Brigance: Binder w/cover & spine inserts
Classroom Calendar Kit: Spanish
Crafty Graphics Stencil Embossing Kit: Braille Guidebook
Crafty Graphics Stencil Embossing Kit: Disk Version
Crafty Graphics Stencil Embossing Kit: Print Version
Good Lookin': ISAVE and the Minimally Responsive Child
MasterPlan Calendar 2002
MasterPlan Calendar 2002 Inserts
Feel n' Peel Stickers: Point Symbols
Feel n' Peel Stickers: Faces
Feel n' Peel Stickers: Reward Statements
Feel n' Peel Stickers: Print/Braille Alphabet
Feel n' Peel Stickers: Assorted
FoldRite
German 4x6 Interpoint Slate (Schreibtafel 9/21)
IntelliTactiles: Standard Overlay Companions
IntelliTactiles: Large Print Users Guide
IntelliTactiles: Braille Users Guide
Let's See: Perceptual Level, Braille Manual
Let's See: Sensory Level, Braille Manual
Nemeth Code Reference Sheet, Braille
NFB Puzzle Map
Picture Maker: Wheatley Tactile Pr./Br Guidebook
Picture Maker: Wheatley Tactile Diagramming Kit
Primer Magnifier
Pumpkin Puzzles
Quick-Draw Paper
"The Littlest Pumpkin" OTWL Series
U.S. Puzzle Map
U.S. Puzzle Map Reference Guide, Print

U.S. Puzzle Map Reference Guide, Braille
VIP Suite (Versatile Imaging Processing Suite)
Word Associations Print and Braille Labels Kit (Braille Edition)
Word Associations Guidebook, Braille
Word Associations Labels Only Print/Braille Sets
Word Associations Print and Braille Labels Kit (Print Edition)
Word Associations Guidebook, Print